# ECONOMIC VARIABLES AND THEIR INFLUENCE ON SCIENTIFIC ACCPLISHMENT

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ABSTRACT

This research looks for an association between economic variables and scientific advancement. More specifically, the main economic variables will be average schooling in the labor force, output per worker, capital per worker and different forms of the three. Index scores will provide a quantitative measure of scientific advancement. This paper explores the relationship of these variables among individuals and societies.

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# Chapter One

## INTRODUCTION

In Charles Murray's book, *Human Accomplishment,* an inventory is a database of people and events (p 76). A significant figure is defined as anyone who is mentioned in at least 50 percent of the qualified sources (books such as biographical dictionaries) for a given inventory. An index score is given to each significant figure and it simply measures how they compare against each other. It ranges from 1 to 100, with 100 being assigned to the most important significant figure and 1 to the not so important (page 79). In appendix 5, Murray provides a roster of significant figures for the fields of astronomy, biology, chemistry, earth science, physics, mathematics, medicine, technology and much more. Included in the rosters is fl, which is the year in which each significant figure became 40 or died, depending of what came first. Also, the rosters include for each significant figure the national origin and the index score. Every model in this paper will either use index scores for a dependent variable or another variable based on index scores.

### Developing a Theory

This paper seeks to find a relationship between scientific achievement and economic variables. Although there are countless economic variables, average schooling in the labor force, output per worker, and capital per worker will be the three main variables of interest.

These variables were selected because it is hypothesized that they influence scientific development. If schooling is particularly large for a significant figure, then it is

more likely he or she has devoted more time to school. All things being equal, schooling should increase one's index score because being an expert in any of these eight disciplines would require an education, in order to read and do arithmetic. Also, a large value for schooling would mean more skilled workers within the population. With more skilled workers comes a better chance of some workers becoming a significant figure on Murray's roster. For these two reasons, schooling is believed to play a positive role in determining scientific accomplishment.

In addition, output per worker, is also believed to have a positive relationship with scientific advancement. When society is productive, its scientists are more productive and should have higher index scores. Also, productive societies are wealthier, which means better schools and an overall better quality of education, i.e. more textbooks, a more desirable student teacher ratio, and pupils would be more productive because they would be healthier. Wealthier societies also can afford to allocate more resources to research and to universities. A variable that is important to output per worker is capital per worker because capital is what makes output. Workers from a society fortunate enough to have an access to plenty of capital enjoy more tools, equipment, buildings and infrastructure than would someone from a society with less capital per worker, and therefore should be more productive. One way this increase in productivity can be reflected is by more advancement in scientific disciplines.

Murray provides everything needed to have a quantitative measure of advancement in science. The three variables from the theory are provided by Dr. Robert Tamura at: http://people.clemson.edu/~rtamura/ on the link entitled "Data with corrections of errors in UK, Denmark and Haiti." Murray distinguishes between Scotland

and England, while Tamura has UK. For Simplicity, Scotland, England will be assumed to be the same thing as UK. For similar reasons, it will be assumed that the Ukraine is the same as Russia. Many significant figures lived too long ago for there to be reliable data on average schooling in the labor force, output per worker, and capital per worker for the year of their fl, thus they were dropped from the data. This research only looks at the 732 who have values of fl for the years between 1831 and 1950.

## Methods of Research

This section assumes fundamental knowledge of statistics. Using a computer to perform regression analysis is the primary tool used for finding evidence suggesting a relationship between scientific advancement and the three variables mentioned. When analyzing regression models, the first thing to look at is a value that the computer calculates known as the F statistic. The F statistic is used to test the null hypothesis that all the β parameters in the model are equal to 0 versus the alternative hypothesis that at least one β parameter is not 0. The computer also calculates a p-value associated with the F statistic. Generally, and for the purpose of this research, the null hypothesis will be rejected only if the p-value is less than 0.05.

Another calculation a computer makes when it runs a regression is a value for the estimated coefficient for each independent variable, often called βhat in econometrics. The value of βhat can be interpreted as the estimated effect on the dependent variable for one unit change in the particular regressor holding all the other independent variables constant (Stock and Watson pgs 199 and 194). The word estimated should be noted. The true value for the coefficient, for any variable can not be known since it is impossible to collect all the data. Instead the computer estimates coefficients based on the sample of

data it is given. Any non-zero value for an observed βhat does not prove a relationship really exists for the dependent and independent variables, its calculated non zero value could have just been a coincident. Often in regression analysis there is concern that any β is actually equal to zero, implying that its variable independent to the dependent variable (Fair p 22). Fortunately, the computer also gives everything needed to test for this concern.

For every regression, the computer provides information needed to test the null hypothesis that β is equal to zero versus the alternative hypothesis that β is not equal to zero. This information includes a standard error of each estimated coefficient, which can be thought of as an estimator of the standard deviation of the coefficient (Stock and Watson p781). The test statistic is βhat divided by its standard error. According to Stock and Watson, the test statistic has a normal distribution, and given this normal distribution, the next useful number the computer gives it the p-value for each coefficient. It is the probability of observing a value of the coefficient at least as different from zero as the one actually computed, assuming that the null hypothesis is true. A small p-value supports the alternative hypothesis that β is not equal to zero because, the computer is testing to see if β differs from 0 by default. If it is smaller than the usual standard of 5%, then the null hypothesis ($\beta = 0$) is said to be rejected in favor of the alternative hypothesis ($\beta \neq 0$) at the 5% significance level (p 150-151).

Finally, just to make reading computer output simpler, the 95% confidence interval for β is provided. The confidence interval is another way to draw the same conclusion as above regarding the true coefficient's value. One interpretation of the 95% confidence interval is an interval that has a 95% chance of containing the true value of

the coefficient. If zero falls in this interval then the null hypothesis ($\beta = 0$) cannot be rejected at the 5% level of significance (Stock and Watson p156.

## Chapter Two

## BEGINNING THE SERCH

The search for a relationship between index scores and the economic variables of interest begins by regressing index scores with schooling, output per worker, and capital per worker to make regression #1. This creates the simplest model included in this research. The data can be found in appendix A. The results are the following:

| Source | SS | df | MS | Number of obs = | 732 |
|---|---|---|---|---|---|
| | | | | F( 3, 728) = | 1.34 |
| Model | 748.399214 | 3 | 249.466405 | Prob > F = | 0.2600 |
| Residual | 135462.097 | 728 | 186.074309 | R-squared = | 0.0055 |
| | | | | Adj R-squared = | 0.0014 |
| Total | 136210.496 | 731 | 186.334468 | Root MSE = | 13.641 |

| index | Coef. | Std. Err. | t | P>t | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| school | .4534794 | .6213807 | 0.73 | 0.466 | -.7664325 | 1.673391 |
| ypw | -.0003117 | .0003034 | -1.03 | 0.305 | -.0009074 | .000284 |
| kpw | -.0000293 | .0001854 | -0.16 | 0.874 | -.0003934 | .0003347 |
| _cons | 14.34051 | 1.219515 | 11.76 | 0.000 | 11.94633 | 16.7347 |

Table 2:1: Results of Regression #1

Despite all the reason given to believe that these variable effect index scores, it cannot be inferred that they affect individual performance. At 1.34 the Fobs is very low. Consequently the p-value is 0.26, which is much greater that the rejection criteria of 0.05. The null hypothesis can not be rejected. It therefore should be no surprise that none of the $\beta$ parameters have test-statistics greater than |1.96| and zero is in all the confidence interval.

### Non Linear Regression

Even though the first model did not provide any striking results, it is still possible that a nonlinear regression model would capture a relationship between index scores and the three variables of interest. Stock and Watson prescribe a nonlinear regression function when the effect on the dependent variable of a change in the independent variable depends on the value of the independent variable itself (p 254). In the present case, increasing schooling, output per worker, or capital per worker may have a greater effect on index scores when scores are low and not such a great effect when scores are already fairly high. The main reason being is that index scores cannot be above 100, while there is no such restriction on the independent variables. Its clear how this could repress any signs of a relationship. Starting at one and pretending there is a perfect relationship existing, index scores will increase as the independent variables increase, yet once scores reach 100 they must stop rising no matter how much higher the independent variables continue to climb, making the perfect relationship unfeasible afterwards. Stock and Watson define a log-log model as "a nonlinear regression function in which the dependent variable is ln(Y) and the independent variable is ln(X)[1]" (p 779). Regression #2 will resemble this formation because the dependent variable will be the natural log of index scores and the independent variables will be the natural log of output and capital per worker, along with some other non-logarithmic variables.

Also, for this second attempt, it will be convenient to create country dummy variables. As Stock and Watson explain, βhat has a slightly different meaning when its variable is binary. By only taking the value of either 1 or 0, binary variables are not continuous. Thus, βhat cannot be thought of as the estimated effect on the dependent

[1] Ln stands for natural log.

variable given a one unit change in which ever variable βhat is specific. Instead, βhat is the difference between the expected value of the dependent variable when the binary variable takes on the value of 1 and when it is equal to 0 (p158-159). Any significant test statistic for these additional 25 variables (there are 26 national origins or levels in the dataset) could be a signal that a variable specific to location determines index scores and is being overlooked by the model. For instance, the theory does not include elevation. Yet, hypothetically speaking, if elevation plays a part in the development of a field, then the binary variables will be significant for places like Switzerland, located high in the Alps.

One last addition to this second model would be to add yet another variable, which will be named year and be equal to the average between fl and the year from Data with corrections of errors in UK, Denmark and Haiti that matches the closest to it. The reason is because the observations do not only vary by geographic location, but also by time. It is also true that schooling, output per worker, capital per worker are all functions of time, meaning all three tend to grow with time in any society as evident in the next three pictures.

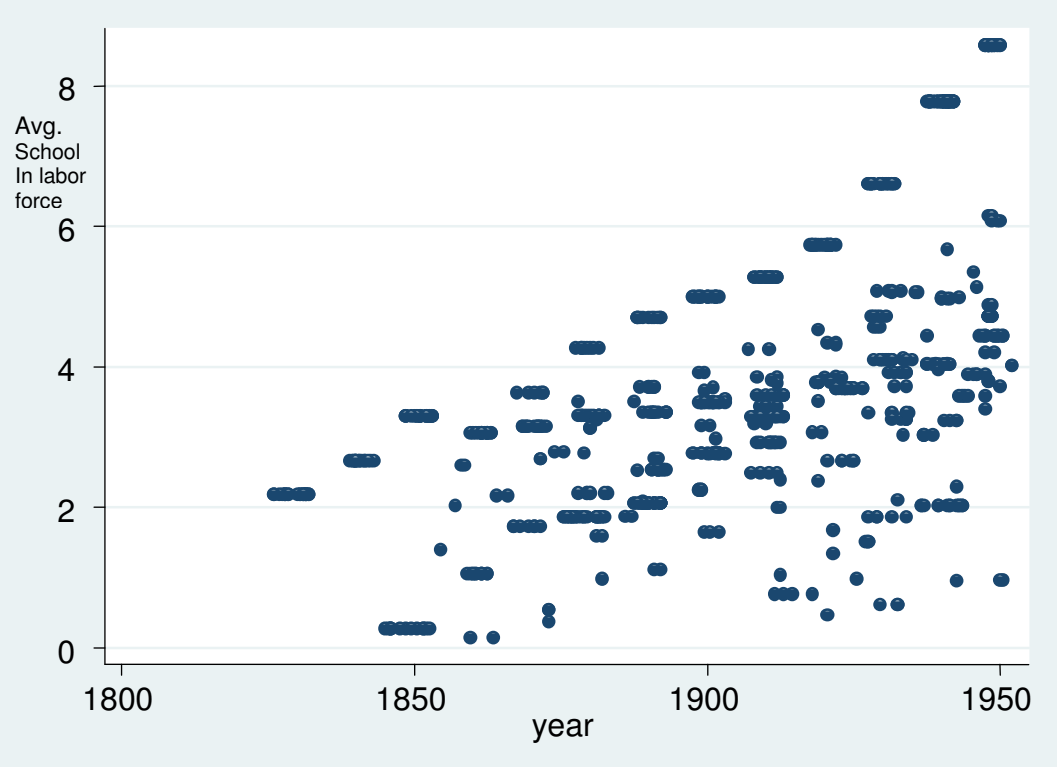


Figure 2:1: Average schooling plotted with year

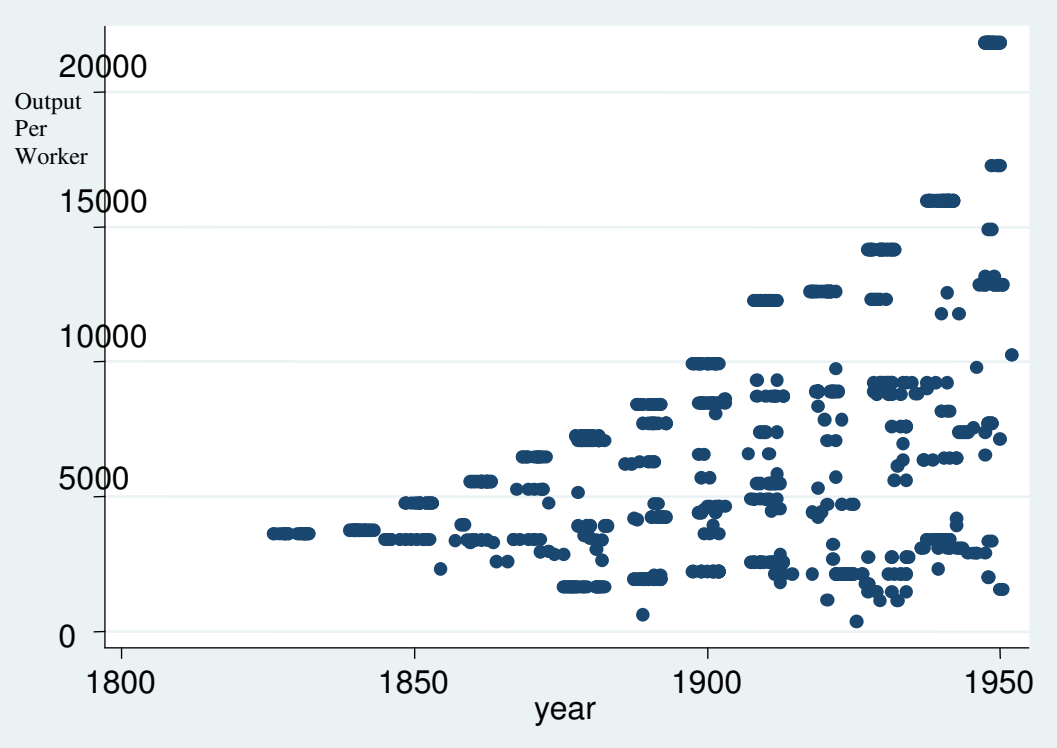


Figure 2:2: output per worker plotted with year


Figure 2:3: Capital per worker plotted with year

Scientist who lived more recently might tend to have better index scores than their predecessors, all things being equal, because they would have been lucky enough to live later on when the three variables of interest had ample time to grow. A positive and significant value for the test statistic will suggest that this is indeed the case, supporting the theory that average schooling in the labor force, output per worker and capital per worker increase index scores. On the other hand, if this variable is negative and significant then it would mean that index scores tend to decrease over time, despite growth in the three main independent variables. If year is insignificant, then index scores have not been changing.

The data used for regression #2 is in appendix 1 and the results are charted on the next page.

```
Source |       SS       df       MS                    Number of obs =     731
```

| | | | | | |
|---|---|---|---|---|---|
| Model | 59.062796 | 29 | 2.03664814 | F( 29, 701) | 1.79 |
| Residual | 796.647163 | 701 | 1.13644388 | Prob > F | 0.0069 |
| | | | | R-squared | 0.0690 |
| Total | 855.709959 | 730 | 1.17220542 | Adj R-squared | 0.0305 |
| | | | | Root MSE | 1.066 |

| ln_index | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| school | -.0371677 | .0741703 | -0.50 | 0.616 | -.1827903 | .1084548 |
| ln_ypw | -.4148864 | .3208945 | -1.29 | 0.196 | -1.044916 | .215143 |
| ln_kpw | .1294952 | .1993492 | 0.65 | 0.516 | -.2618979 | .5208883 |
| year | -.0013207 | .004239 | -0.31 | 0.755 | -.0096433 | .0070019 |
| austria | -1.014106 | .6779643 | -1.50 | 0.135 | -2.34519 | .3169777 |
| belgium | -1.495705 | .7047739 | -2.12 | 0.034 | -2.879426 | -.1119848 |
| Canada | -.6639853 | .6865383 | -0.97 | 0.334 | -2.011903 | .6839324 |
| Denmark | -.8999314 | .698942 | -1.29 | 0.198 | -2.272202 | .472339 |
| UK | -.8598066 | .6327186 | -1.36 | 0.175 | -2.102057 | .382444 |
| France | -1.103133 | .6438219 | -1.71 | 0.087 | -2.367183 | .1609174 |
| Germany | -1.047514 | .702594 | -1.49 | 0.136 | -2.426955 | .3319266 |
| Greece | -3.236248 | 1.305126 | -2.48 | 0.013 | -5.798672 | -.673824 |
| Hungary | -1.047105 | .7972169 | -1.31 | 0.189 | -2.612324 | .5181139 |
| India | -2.494957 | .9784402 | -2.55 | 0.011 | -4.415981 | -.5739323 |
| Ireland | -.7588717 | 1.300791 | -0.58 | 0.560 | -3.312784 | 1.79504 |
| Italy | -.880949 | .7023765 | -1.25 | 0.210 | -2.259963 | .4980646 |
| Japan | -.7129045 | .8372746 | -0.85 | 0.395 | -2.356771 | .9309618 |
| N_Zealand | .3577771 | .9799608 | 0.37 | 0.715 | -1.566233 | 2.281787 |
| Netherlands | -.8184457 | .6594148 | -1.24 | 0.215 | -2.11311 | .4762188 |
| Norway | -.6413004 | .7896431 | -0.81 | 0.417 | -2.191649 | .9090485 |
| Poland | -1.325268 | .8954529 | -1.48 | 0.139 | -3.083359 | .4328226 |
| Portugal | -3.440336 | 1.311417 | -2.62 | 0.009 | -6.015112 | -.8655605 |
| Romania | -3.889005 | 1.54736 | -2.51 | 0.012 | -6.92702 | -.8509905 |
| Russia | -1.43512 | .7765875 | -1.85 | 0.065 | -2.959836 | .0895961 |
| So_Africa | -.6327123 | 1.297626 | -0.49 | 0.626 | -3.180412 | 1.914987 |
| Spain | -1.062793 | 1.010713 | -1.05 | 0.293 | -3.04718 | .921594 |
| Sweden | -1.384792 | .6862496 | -2.02 | 0.044 | -2.732143 | -.0374415 |
| Switzerland | -1.164784 | .6917697 | -1.68 | 0.093 | -2.522973 | .1934047 |
| USA | -.5069351 | .6456036 | -0.79 | 0.433 | -1.774483 | .7606131 |
| _cons | 8.130834 | 6.210084 | 1.31 | 0.191 | -4.061758 | 20.32343 |

Table 2:2: Regression #2 results

From all the country dummy variables, Belgium, Greece, India, Portugal, Romania, and Sweden are the only ones significant. Most likely, it is just a coincident because the number of observations for all of these countries is low, 12, 1, 6, 1, 1, and 13. Year is insignificant, which shows index scores are not getting any larger with time, despite all the increases seen in schooling, output per worker, and capital per worker. Also, schooling still does not seem to have and effect and, even after taking their natural logs, it still cannot be inferred that output and capital are related to index scores.

Chapter Three

## A SHIFT IN FOCUS TOWARDS SOCIETY

Despite all the weak evidence thus far, the search for an association between how distinguish a scientist can expect to be and average schooling in the labor force, output per worker and capital per worker continues using multiple regression analysis. The main change will be in the dependent variable. Thus far the dependent variables have been index scores and the natural log of index scores, which both focus on individual performance. Hereafter, that will change. As already mentioned, the scientists vary by both their national origin and by the times in which they lived. That is why the data will first be divided by national origins and then into five year increments. The first five year increment is 1821-1825 and the last is 1946-1950. The sum of the index scores in a given five year increment and country will be called sum index and the average of the index scores in a given five year increment and country will be called average index. From now on, the dependent variables will be one or the other, and they will be regressed with new independent variables formed in a similar fashion. One new independent variable is average schooling and it is equal to the average schooling in the labor force for a given five year increment and country. Average output per worker and average capital per worker are two additional variables formed by the same method. To view this data, which is the bases for all the rest of the models, see appendix B.

Below are the results of regression #3 when sum index is regressed against average schooling, average output per worker, and average capital per worker:

```
Source |       SS             df       MS              Number of obs =     202
-------------+------------------------------           F(  3,   198) =    6.75
       Model |  62841.5788     3  20947.1929           Prob > F      =  0.0002
```

```
    Residual |  614213.946   198  3102.09064           R-squared     =  0.0928
-------------+------------------------------           Adj R-squared =  0.0791
       Total |  677055.525   201  3368.43545           Root MSE      =  55.696

------------------------------------------------------------------------------
    sumindex |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   avgschool |   11.74254   4.404418     2.67   0.008     3.056947    20.42813
  averageypw |   .0034213   .0023105     1.48   0.140     -.001135    .0079776
      avgkpw |  -.0033447     .00124    -2.70   0.008      -.00579   -.0008995
       _cons |   18.32459   9.301249     1.97   0.050    -.0176358    36.66682
------------------------------------------------------------------------------
```

Table 3:1: Regression #3 Results

This is the first model in this research to provide any interesting results. First of all, the p-value for the Fobs is less that .05, which means at least one of the β parameters is not 0. Accordingly, when average schooling increases by one unit, the sum of index scores can be expected to increase by 11.74254 units. Since the 95% confidence interval for average schooling is positive and does not contain 0, there is 95% certainty that β is not 0. Statistically, it can be inferred that average schooling does influence sum index. That is some evidence supporting the theory.

On the other hand, 0 is in the 95% confidence interval for average output per worker. It is more reasonable to infer that the coefficient for average output per worker is equal to 0 that it is to infer it is not equal to 0. In other words, fail to reject the null hypothesis that the coefficient for average output per worker is equal to 0. The biggest surprise is the absolute value for the t-stat of average capital per worker, which is the greatest in value. At the 95% confidence level it can be inferred that a given increase of one unit in average capital per worker will cause sum index scores to decrease by 0.00334. The negative relationship does not only fail to fit the theory, but also it contradicts the theory. Because the correlation between average output per worker and average capital per worker is high, 0.8273, to be exact, and the coefficient on average

capital per worker has an unexpected sign, there is reason to suspect mulcollinearity between average out put per worker and average capital per worker. It is therefore worth while to run the same regression after dropping one from the model. The results are below:

| Source | SS | df | MS | Number of obs = | 202 |
|---|---|---|---|---|---|
| Model | 40269.6099 | 2 | 20134.8049 | F( 2, 199) = | 6.29 |
| Residual | 636785.915 | 199 | 3199.92922 | Prob > F = | 0.0022 |
| Total | 677055.525 | 201 | 3368.43545 | R-squared = | 0.0595 |
| | | | | Adj R-squared = | 0.0500 |
| | | | | Root MSE = | 56.568 |

| sumindex | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| avgschool | 10.49561 | 4.44863 | 2.36 | 0.019 | 1.723105 | 19.26812 |
| averageypw | -.0005055 | .0018223 | -0.28 | 0.782 | -.004099 | .0030879 |
| _cons | 18.84316 | 9.444771 | 2.00 | 0.047 | .2184794 | 37.46784 |

Table 3:2 Regression #4 Results

Since average output per worker becomes insignificant, this does not yield the results that were expected and thus, multicollinearity must not be a threat.

Regression #5 uses average index scores for a given five year increment and national origin, or simply average index for a dependent variable. The conclusions are similar to most of the other models in sense that none of the independent variables are 0 (F statistic has a p value <.05). Again, the data is in Appendix B.

| Source | SS | df | MS | Number of obs = | 202 |
|---|---|---|---|---|---|
| Model | 415.915593 | 3 | 138.638531 | F( 3, 198) = | 1.60 |
| Residual | 17146.4971 | 198 | 86.5984701 | Prob > F = | 0.1904 |
| Total | 17562.4127 | 201 | 87.3751874 | R-squared = | 0.0237 |
| | | | | Adj R-squared = | 0.0089 |
| | | | | Root MSE = | 9.3058 |

| avgindex | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| avgschool | 1.421449 | .735896 | 1.93 | 0.055 | -.0297509 | 2.872649 |
| averageypw | -.0006335 | .000386 | -1.64 | 0.102 | -.0013948 | .0001278 |
| avgkpw | -.0000125 | .0002072 | -0.06 | 0.952 | -.000421 | .0003961 |
| _cons | 12.11829 | 1.554065 | 7.80 | 0.000 | 9.053647 | 15.18293 |

Table 3:3 Regression #5 Results

However, it is slightly consistence with regression #3 because average schooling is extremely close to being significant at the 5% level of significance, as 0 is just barely in the confidence interval and the t-stat, 1.93, is just 0.03 from 1.96. Yet, having 0 in their confidence intervals, average output per worker and average capital per worker are insignificant.

## Inspecting Sum Index Closer

The noticeable results of regression #3, leads to further analysis of the sum index and its factors. Regression #6 is the log-log version of regression #3 with the addition of one more independent variable, the natural log of the average population in a given five year increment and national origin. The data is appendix B. The results are displayed on the next page:

| Source | SS | df | MS | Number of obs = | 202 |
|---|---|---|---|---|---|
| Model | 106.774962 | 4 | 26.6937406 | F( 4, 197) = | 19.88 |
| Residual | 264.469837 | 197 | 1.34248648 | Prob > F = | 0.0000 |
| Total | 371.244799 | 201 | 1.84698905 | R-squared = | 0.2876 |
| | | | | Adj R-squared = | 0.2731 |
| | | | | Root MSE = | 1.1587 |

| lnsumindex | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| lnavgschool | .5300703 | .153143 | 3.46 | 0.001 | .2280602 | .8320805 |
| lnavgypw | .7338123 | .2680686 | 2.74 | 0.007 | .2051599 | 1.262465 |
| lnavgkpw | -.6487067 | .2411071 | -2.69 | 0.008 | -1.124189 | -.1732245 |
| lnavgpop | .5088028 | .0656722 | 7.75 | 0.000 | .3792921 | .6383135 |
| _cons | -2.944514 | 1.476341 | -1.99 | 0.047 | -5.855976 | -.0330525 |

Table 3:4: Results of Regression #6 Results

Regression #6 has the best results. It can be inferred with more than 95% confidence that all independent variables influence the natural log of sum index. It fits the theory because the natural logs of the averages of schooling and output per worker are positively related to the natural log of sum index, as the theory says they should. However, the natural log of average capital per worker is negatively related to the dependent variable. It is apparent that the natural log of the average population plays a tremendous positive role on how society advancements in the physical sciences. If the true value for it coefficient is indeed zero, then there is a 0% chance of observing a t-stat as large as the actual 7.75.

## Chapter Four

## CONCLUSIONS

For individuals perusing a career in the physical sciences, this research finds no evidence that the health of the economy in which they live will affect their index score. The evidence comes from regression #1, where statistically there is a good probability that schooling in the labor force, output per worker and capital per worker are not factors determining an individual's index scores. Regression #2 further supports this point where, even after taking natural logs, these three variables still do not seen to be influencing index scores. The average index score of the all scientist in a giving five year increment a national origin, can be though of as index score per scientist, making it another measure of individual performance similar to index score. Still, for reasons based on the analysis of regression #5 charted in Figure 3:2, it does not seem to be

affected by any of the economic variables originally believed to be influential in the original theory.

Even though no ties to individual performance were found, according to regression #3 there is ties to scientific development within a society and average schooling in the labor force, average output per worker and average capital per worker. In that model a one unit increase in average schooling is associated with a positive change in society's advancement in physical sciences measured by sum index just as the theory would predict. Likewise, in regression #6, the coefficient on the natural log of average schooling is statistically believed to be nonzero and the sign is positive like the theory should predict. As for average output per worker, it is disregarded in regression #3 as a significant factor of sum index because of its low t-stat. However in regression #6, it can be assumed that the natural log of the average output per worker plays a positive role in the value of the natural log of sum index.

The variables representing capital per worker is average capital per worker in regression #3 and the natural log of average capital per worker in regression #5. Unlike average output per worker and the natural log of output per worker, they are consistently significant in both models. The problem with them is that they both influence, the dependent variables in a negative way, meaning a one unit increase in them is expected to decrease their regressands, contradicting the theory.

It is clear that the natural log of average population plays a part in the natural log of sum index due to its large t-stat. It is no surprise that a larger population would produce more people smart enough to go down in history as an important developer of a discipline. Similarly, economists Andrew Bernard and Meghan Busse did a study about

the determinants of success in the Olympic Games that happen every four years. One thing the study found was that population was a key determinant. Even if a country had low output per worker, yet a large population, it could expect to take home the same amount of medal as a wealthy country with fewer citizens (Mankiw p218-219). In that study, success is defined as athletic achievement and is measured in medals taken home in every four year increment. Since it is observed how important population can be to the natural log of sum indexes, maybe the same idea is true when applied to this research, which would explaining why population is such a determinate. The only difference would be that success is now defined as scientific achievement and measured as the sum of index scores in five year increments. Similarly, perhaps a country with low output per worker but a high population can expect to perform as well in the physical sciences as a wealthy country with a lower population but a higher output per worker.

## Pitfalls

Before finalizing the conclusion, it is necessary to discuss some possible pitfalls of the research. The main problem for all the regressions is that the data given by Murray does not perfectly match Tamura's data set. Regression #2 and #3 could have been affected because the fl given by Murray was not always equal to the year taken from Tamura's data set. Observations at the most were mismatched in this since by 11 years, but the majority was mismatched by less. The data for the rest of the regressions was not perfect either. Not one single observation had data available for all of the five years it contained. Frequently, the data used to calculate an observation's schooling and output per worker…etc came from years not even in the correct five year increment. Data just had to be match as best as possible, but not perfectly.

APPENDICES

## Appendix A

### The Bases of Regression #1 and #2

| Index | Nat'l origin | Fl | Year | school | ypw | kpw |
|---|---|---|---|---|---|---|
| 1 | Romania | | 1921 | 1930 | 0.98664 | 379.6423 | 512.0197 |
| 6 | Hungary | | 1888 | 1890 | 2.08291 | 633.468 | 850.8654 |
| 10 | India | | 1928 | 1931 | 0.60868 | 1134.79 | 1788 |
| 1 | India | | 1934 | 1931 | 0.60868 | 1134.79 | 1788 |

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|---|---|---|---|---|---|---|
| 1 | India | 1934 | 1931 | 0.60868 | 1134.79 | 1788 |
| 7 | India | 1920 | 1921 | 0.46773 | 1157.246 | 1776.374 |
| 23 | Poland | 1924 | 1931 | 1.8586 | 1457.279 | 3789.945 |
| 14 | Poland | 1927 | 1931 | 1.8586 | 1457.279 | 3789.945 |
| 18 | Poland | 1927 | 1931 | 1.8586 | 1457.279 | 3789.945 |
| 8 | Poland | 1932 | 1931 | 1.8586 | 1457.279 | 3789.945 |
| 11 | Poland | 1937 | 1931 | 1.8586 | 1457.279 | 3789.945 |
| 1 | India | 1949 | 1951 | 0.9624 | 1554.987 | 2533.438 |
| 9 | India | 1950 | 1951 | 0.9624 | 1554.987 | 2533.438 |
| 24 | Germany | 1871 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 23 | Germany | 1871 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 25 | Germany | 1872 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 20 | Germany | 1872 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 27 | Germany | 1873 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 3 | Germany | 1873 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 41 | Germany | 1874 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 26 | Germany | 1874 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 16 | Germany | 1874 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 8 | Germany | 1875 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 1 | Germany | 1875 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 15 | Germany | 1876 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 5 | Germany | 1877 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 5 | Germany | 1878 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 16 | Germany | 1878 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 6 | Germany | 1879 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 3 | Germany | 1882 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 10 | Germany | 1882 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 12 | Germany | 1882 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 29 | Germany | 1883 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 89 | Germany | 1883 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 3 | Germany | 1883 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 12 | Germany | 1884 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 18 | Germany | 1884 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 22 | Germany | 1885 | 1880 | 1.85554 | 1635.807 | 1770.421 |
| 22 | Russia | 1928 | 1926 | 1.51199 | 1770.619 | 2773.286 |
| 22 | Russia | 1929 | 1926 | 1.51199 | 1770.619 | 2773.286 |
| 17 | Ukraine | 1929 | 1926 | 1.51199 | 1770.619 | 2773.286 |
| 1 | Portugal | 1914 | 1911 | 1.03608 | 1796.679 | 1947.576 |
| 11 | Germany | 1885 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 50 | Germany | 1885 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 16 | Germany | 1886 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 8 | Germany | 1887 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 2 | Germany | 1887 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 4 | Germany | 1888 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 5 | Germany | 1888 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 7 | Germany | 1888 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 14 | Germany | 1888 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 15 | Germany | 1889 | 1890 | 2.06127 | 1938.663 | 1919.878 |

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|---|---|---|---|---|---|---|
| 3 | Germany | 1889 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 22 | Germany | 1889 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 10 | Germany | 1890 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 18 | Germany | 1890 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 4 | Germany | 1890 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 8 | Germany | 1890 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 26 | Germany | 1892 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 16 | Germany | 1892 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 21 | Germany | 1892 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 11 | Germany | 1892 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 4 | Germany | 1893 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 3 | Germany | 1894 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 30 | Germany | 1894 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 44 | Germany | 1894 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 59 | Germany | 1894 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 10 | Germany | 1894 | 1890 | 2.06127 | 1938.663 | 1919.878 |
| 8 | Poland | 1946 | 1950 | 3.79347 | 2022.602 | 4958.387 |
| 1 | Poland | 1946 | 1950 | 3.79347 | 2022.602 | 4958.387 |
| 42 | Japan | 1892 | 1890 | 1.10964 | 2081.798 | 1909.83 |
| 5 | Japan | 1894 | 1890 | 1.10964 | 2081.798 | 1909.83 |
| 4 | Ukraine | 1906 | 1917 | 0.76311 | 2121.57 | 3321.589 |
| 17 | Russia | 1909 | 1917 | 0.76311 | 2121.57 | 3321.589 |
| 15 | Russia | 1912 | 1917 | 0.76311 | 2121.57 | 3321.589 |
| 1 | Russia | 1919 | 1917 | 0.76311 | 2121.57 | 3321.589 |
| 14 | Germany | 1929 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 8 | Germany | 1931 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 5 | Germany | 1933 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 47 | Germany | 1933 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 36 | Germany | 1935 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 7 | Germany | 1935 | 1933 | 3.91837 | 2123.289 | 3133.968 |
| 100 | Germany | 1919 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 14 | Germany | 1919 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 18 | Germany | 1919 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 33 | Germany | 1920 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 4 | Germany | 1921 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 7 | Germany | 1921 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 20 | Germany | 1922 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 5 | Germany | 1922 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 32 | Germany | 1922 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 10 | Germany | 1922 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 1 | Germany | 1923 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 22 | Germany | 1923 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 1 | Germany | 1924 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 6 | Germany | 1924 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 8 | Germany | 1925 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 7 | Germany | 1925 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 2 | Germany | 1928 | 1925 | 3.6993 | 2124.113 | 4113.537 |
| 9 | Germany | 1928 | 1925 | 3.6993 | 2124.113 | 4113.537 |

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|---|---|---|---|---|---|---|
| 3 | Germany | 1895 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 7 | Germany | 1895 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 33 | Germany | 1898 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 7 | Germany | 1898 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 28 | Germany | 1898 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 10 | Germany | 1900 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 19 | Germany | 1902 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 17 | Germany | 1902 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 40 | Germany | 1902 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 11 | Germany | 1903 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 11 | Germany | 1904 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 20 | Germany | 1904 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 15 | Germany | 1904 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 12 | Germany | 1904 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 11 | Germany | 1904 | 1900 | 2.76714 | 2223.087 | 2796.82 |
| 12 | Ireland | 1943 | 1936 | 3.9487 | 2321.667 | 2889.114 |
| 3 | Belgium | 1853 | 1856 | 1.39364 | 2323.665 | 2030.761 |
| 1 | Germany | 1905 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 7 | Germany | 1906 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 1 | Germany | 1906 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 20 | Germany | 1908 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 1 | Germany | 1908 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 6 | Germany | 1908 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 18 | Germany | 1909 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 6 | Germany | 1911 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 14 | Germany | 1912 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 8 | Germany | 1912 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 2 | Germany | 1913 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 19 | Germany | 1913 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 9 | Germany | 1914 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 14 | Germany | 1914 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 3 | Germany | 1915 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 7 | Germany | 1916 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 8 | Germany | 1916 | 1910 | 3.29147 | 2566.305 | 3571.579 |
| 23 | Belgium | 1862 | 1866 | 2.16433 | 2584.889 | 2544.213 |
| 12 | Belgium | 1866 | 1866 | 2.16433 | 2584.889 | 2544.213 |
| 25 | Italy | 1883 | 1881 | 0.9786 | 2632.133 | 2602.862 |
| 1 | Greece | 1923 | 1920 | 1.33599 | 2691.088 | 1755.593 |
| 14 | Hungary | 1925 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 1 | Hungary | 1933 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 30 | Hungary | 1933 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 7 | Hungary | 1938 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 10 | Hungary | 1938 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 3 | Hungary | 1939 | 1930 | 3.33864 | 2746.589 | 3508.572 |
| 15 | Japan | 1912 | 1913 | 2.39611 | 2848.883 | 3362.716 |
| 15 | Norway | 1873 | 1875 | 2.78637 | 2850.842 | 3693.585 |
| 5 | Norway | 1876 | 1875 | 2.78637 | 2850.842 | 3693.585 |
| 11 | Hungary | 1940 | 1949 | 3.89017 | 2897.392 | 3012.092 |

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|---|---|---|---|---|---|---|
| 6 | Hungary | 1942 | 1949 | 3.89017 | 2897.392 | 3012.092 |
| 19 | Hungary | 1943 | 1949 | 3.89017 | 2897.392 | 3012.092 |
| 26 | Hungary | 1943 | 1949 | 3.89017 | 2897.392 | 3012.092 |
| 15 | Hungary | 1946 | 1949 | 3.89017 | 2897.392 | 3012.092 |
| 1 | Sweden | 1873 | 1870 | 2.68775 | 2938.216 | 1814.71 |
| 32 | Sweden | 1873 | 1870 | 2.68775 | 2938.216 | 1814.71 |
| 6 | Italy | 1875 | 1871 | 0.53316 | 2955.054 | 2655.357 |
| 21 | Italy | 1875 | 1871 | 0.53316 | 2955.054 | 2655.357 |
| 10 | Norway | 1882 | 1880 | 3.24375 | 3042.407 | 3965.944 |
| 5 | Russia | 1934 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 8 | Russia | 1934 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 10 | Russia | 1935 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 1 | Russia | 1940 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 14 | Ukraine | 1940 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 4 | Russia | 1943 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 8 | Russia | 1944 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 5 | Ukraine | 1944 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 7 | Russia | 1946 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 1 | Russia | 1947 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 8 | Ukraine | 1947 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 8 | Russia | 1948 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 5 | Russia | 1948 | 1939 | 2.02353 | 3086.654 | 3704.562 |
| 19 | Finland | 1923 | 1920 | 1.67637 | 3217.841 | 6276.66 |
| 19 | Italy | 1858 | 1861 | 0.14106 | 3291.894 | 2403.325 |
| 15 | Italy | 1866 | 1861 | 0.14106 | 3291.894 | 2403.325 |
| 8 | Japan | 1946 | 1950 | 6.14765 | 3341.122 | 8620.198 |
| 14 | Japan | 1947 | 1950 | 6.14765 | 3341.122 | 8620.198 |
| 2 | Sweden | 1854 | 1860 | 2.02375 | 3367.338 | 2066.431 |
| 4 | France | 1857 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 1 | France | 1858 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 29 | France | 1859 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 31 | France | 1859 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 8 | France | 1860 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 8 | France | 1860 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 100 | France | 1862 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 7 | France | 1862 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 25 | France | 1862 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 3 | France | 1864 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 5 | France | 1864 | 1861 | 1.05599 | 3381.252 | 3410.668 |
| 25 | Austria | 1882 | 1880 | 1.59734 | 3386.627 | 4231.295 |
| 29 | Austria | 1884 | 1880 | 1.59734 | 3386.627 | 4231.295 |
| 17 | France | 1840 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 10 | France | 1841 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 6 | France | 1842 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 4 | France | 1842 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 9 | France | 1842 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 9 | France | 1845 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 8 | France | 1847 | 1850 | 0.27034 | 3403.523 | 3465.11 |

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|---|---|---|---|---|---|---|
| 13 | France | 1849 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 22 | France | 1851 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 45 | France | 1853 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 24 | France | 1853 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 11 | France | 1854 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 6 | France | 1855 | 1850 | 0.27034 | 3403.523 | 3465.11 |
| 6 | Germany | 1936 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 8 | Germany | 1936 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 1 | Germany | 1938 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 10 | Germany | 1938 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 15 | Germany | 1939 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 9 | Germany | 1940 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 22 | Germany | 1940 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 41 | Germany | 1941 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 9 | Germany | 1942 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 6 | Germany | 1942 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 1 | Germany | 1942 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 13 | Germany | 1942 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 37 | Germany | 1943 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 3 | Germany | 1944 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 17 | Germany | 1944 | 1939 | 4.03501 | 3410.082 | 3198.579 |
| 25 | France | 1865 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 9 | France | 1865 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 12 | France | 1867 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 4 | France | 1870 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 10 | France | 1872 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 6 | France | 1872 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 12 | France | 1874 | 1869 | 1.72713 | 3414.123 | 3714.591 |
| 29 | Sweden | 1880 | 1880 | 3.13648 | 3443.404 | 3077.293 |
| 5 | Sweden | 1880 | 1880 | 3.13648 | 3443.404 | 3077.293 |
| 1 | Belgium | 1878 | 1880 | 2.76724 | 3547.938 | 3690.74 |
| 30 | England | 1821 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 6 | Scotland | 1821 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 8 | England | 1823 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 11 | England | 1824 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 31 | England | 1825 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 1 | England | 1825 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 16 | England | 1825 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 1 | England | 1826 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 9 | England | 1826 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 21 | England | 1829 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 13 | England | 1830 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 1 | England | 1830 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 86 | England | 1831 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 8 | England | 1831 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 31 | England | 1831 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 2 | England | 1832 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 33 | England | 1832 | 1831 | 2.180821 | 3604.067 | 2444.009 |

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|---|---|---|---|---|---|---|
| 27 | England | 1832 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 40 | Scotland | 1832 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 22 | England | 1833 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 1 | England | 1833 | 1831 | 2.180821 | 3604.067 | 2444.009 |
| 24 | Italy | 1898 | 1901 | 1.64551 | 3624.306 | 3803.209 |
| 5 | Italy | 1900 | 1901 | 1.64551 | 3624.306 | 3803.209 |
| 10 | Italy | 1903 | 1901 | 1.64551 | 3624.306 | 3803.209 |
| 100 | Scotland | 1837 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 10 | England | 1838 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 12 | Scotland | 1838 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 11 | England | 1839 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 21 | England | 1839 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 11 | Scotland | 1839 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 7 | Scotland | 1839 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 1 | England | 1840 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 16 | England | 1840 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 1 | England | 1841 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 10 | England | 1842 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 32 | England | 1842 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 14 | England | 1843 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 23 | England | 1844 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 13 | Scotland | 1845 | 1841 | 2.65823 | 3747.844 | 3037.49 |
| 3 | France | 1875 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 13 | France | 1878 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 11 | France | 1878 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 1 | France | 1879 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 8 | France | 1879 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 11 | France | 1884 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 1 | France | 1885 | 1881 | 2.20403 | 3908.882 | 4657.356 |
| 29 | Norway | 1902 | 1900 | 3.70853 | 3932.924 | 6769.295 |
| 13 | So. Africa | 1939 | 1946 | 0.95246 | 3934.506 | 5139.058 |
| 1 | Netherlands | 1857 | 1859 | 2.59166 | 3958.687 | 4568.223 |
| 6 | Netherlands | 1858 | 1859 | 2.59166 | 3958.687 | 4568.223 |
| 21 | Belgium | 1886 | 1890 | 2.519 | 4138.069 | 4169.941 |
| 7 | Spain | 1945 | 1940 | 2.29809 | 4183.091 | 5508.854 |
| 9 | Sweden | 1885 | 1890 | 3.50225 | 4191.348 | 4046.645 |
| 5 | Italy | 1917 | 1921 | 2.37499 | 4236.312 | 5465.404 |
| 3 | France | 1890 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 13 | France | 1890 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 28 | France | 1892 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 5 | France | 1892 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 5 | France | 1892 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 7 | France | 1892 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 25 | France | 1893 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 1 | France | 1893 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 1 | France | 1894 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 28 | France | 1894 | 1891 | 2.53461 | 4244.06 | 4811.979 |
| 12 | France | 1895 | 1891 | 2.53461 | 4244.06 | 4811.979 |

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|---|---|---|---|---|---|---|
| 12 | Austria | 1897 | 1900 | 2.24854 | 4409.266 | 5460.325 |
| 9 | Austria | 1897 | 1900 | 2.24854 | 4409.266 | 5460.325 |
| 8 | Austria | 1898 | 1900 | 2.24854 | 4409.266 | 5460.325 |
| 9 | Austria | 1898 | 1900 | 2.24854 | 4409.266 | 5460.325 |
| 10 | France | 1915 | 1921 | 3.06867 | 4415.941 | 7191.639 |
| 15 | France | 1918 | 1921 | 3.06867 | 4415.941 | 7191.639 |
| 1 | Belgium | 1903 | 1900 | 2.77614 | 4419.044 | 5212.681 |
| 16 | Belgium | 1903 | 1900 | 2.77614 | 4419.044 | 5212.681 |
| 88 | N. Zealand | 1911 | 1911 | 3.81719 | 4482.738 | 6443.205 |
| 14 | Sweden | 1899 | 1900 | 3.65873 | 4512.799 | 4379.789 |
| 4 | Italy | 1913 | 1911 | 1.99416 | 4535.78 | 6035.161 |
| 50 | Italy | 1914 | 1911 | 1.99416 | 4535.78 | 6035.161 |
| 47 | France | 1899 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 10 | France | 1900 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 14 | France | 1902 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 1 | France | 1903 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 19 | France | 1903 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 11 | France | 1905 | 1901 | 2.75683 | 4627.58 | 5787.714 |
| 16 | Austria | 1918 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 10 | Austria | 1923 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 1 | Austria | 1923 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 18 | Austria | 1926 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 27 | Austria | 1927 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 7 | Austria | 1927 | 1923 | 2.65904 | 4707.771 | 24453.29 |
| 6 | Denmark | 1892 | 1890 | 2.69075 | 4731.551 | 6608.761 |
| 12 | Denmark | 1893 | 1890 | 2.69075 | 4731.551 | 6608.761 |
| 7 | England | 1846 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 23 | England | 1846 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 13 | England | 1846 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 13 | Scotland | 1848 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 100 | England | 1849 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 4 | England | 1850 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 10 | England | 1850 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 2 | England | 1851 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 1 | England | 1851 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 2 | Scotland | 1851 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 19 | Scotland | 1851 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 28 | England | 1853 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 34 | England | 1853 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 17 | England | 1853 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 18 | England | 1854 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 9 | England | 1854 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 16 | England | 1854 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 20 | England | 1855 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 8 | England | 1855 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 11 | England | 1855 | 1851 | 3.299947 | 4740.073 | 4090.741 |
| 2 | Canada | 1875 | 1871 | 0.37697 | 4747.868 | 5223.512 |
| 6 | Belgium | 1906 | 1910 | 3.1911 | 4885.511 | 6286.582 |

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|---|---|---|---|---|---|---|
| 2 | Belgium | 1910 | 1910 | 3.1911 | 4885.511 | 6286.582 |
| 1 | Austria | 1905 | 1910 | 2.48786 | 4918.449 | 6152.492 |
| 26 | Austria | 1908 | 1910 | 2.48786 | 4918.449 | 6152.492 |
| 13 | Austria | 1911 | 1910 | 2.48786 | 4918.449 | 6152.492 |
| 7 | Austria | 1914 | 1910 | 2.48786 | 4918.449 | 6152.492 |
| 15 | Netherlands | 1877 | 1879 | 3.50635 | 5138.171 | 6984.27 |
| 12 | USA | 1865 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 13 | USA | 1869 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 6 | USA | 1871 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 11 | USA | 1873 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 3 | USA | 1874 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 8 | USA | 1874 | 1870 | 3.63375 | 5253.609 | 5962.68 |
| 1 | Belgium | 1918 | 1920 | 3.5175 | 5307.007 | 7740.873 |
| 11 | France | 1906 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 1 | France | 1907 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 15 | France | 1910 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 10 | France | 1910 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 5 | France | 1911 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 8 | France | 1911 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 12 | France | 1912 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 12 | France | 1912 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 36 | France | 1913 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 5 | France | 1914 | 1911 | 2.921 | 5502.15 | 7027.253 |
| 40 | England | 1858 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 16 | England | 1859 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 4 | Scotland | 1860 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 32 | England | 1861 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 27 | England | 1862 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 1 | Scotland | 1862 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 4 | Scotland | 1862 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 10 | Scotland | 1862 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 34 | England | 1863 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 3 | England | 1864 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 37 | England | 1864 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 27 | Scotland | 1864 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 29 | Scotland | 1864 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 3 | England | 1865 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 22 | England | 1865 | 1861 | 3.059513 | 5569.043 | 4844.158 |
| 17 | Belgium | 1934 | 1930 | 3.72049 | 5606.95 | 6163.57 |
| 9 | Belgium | 1938 | 1930 | 3.72049 | 5606.95 | 6163.57 |
| 23 | Denmark | 1897 | 1901 | 3.16468 | 5702.478 | 9113.485 |
| 6 | Denmark | 1900 | 1901 | 3.16468 | 5702.478 | 9113.485 |
| 10 | Sweden | 1924 | 1920 | 3.85967 | 5712.778 | 10055.29 |
| 1 | Sweden | 1914 | 1910 | 3.76716 | 5848.01 | 6534.569 |
| 8 | Spain | 1935 | 1930 | 2.10362 | 6131.535 | 5990.326 |
| 5 | Switzerland | 1884 | 1888 | 1.86681 | 6218.425 | 7477.125 |
| 9 | Switzerland | 1886 | 1888 | 1.86681 | 6218.425 | 7477.125 |
| 44 | Netherlands | 1888 | 1889 | 3.71994 | 6287.392 | 7407.689 |

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|---|---|---|---|---|---|---|
| 17 | Netherlands | 1891 | 1889 | 3.71994 | 6287.392 | 7407.689 |
| 9 | Netherlands | 1891 | 1889 | 3.71994 | 6287.392 | 7407.689 |
| 20 | Netherlands | 1892 | 1889 | 3.71994 | 6287.392 | 7407.689 |
| 19 | Netherlands | 1893 | 1889 | 3.71994 | 6287.392 | 7407.689 |
| 26 | Netherlands | 1893 | 1889 | 3.71994 | 6287.392 | 7407.689 |
| 7 | Austria | 1933 | 1934 | 3.03657 | 6341.034 | 18039.02 |
| 32 | Austria | 1940 | 1934 | 3.03657 | 6341.034 | 18039.02 |
| 1 | Austria | 1940 | 1934 | 3.03657 | 6341.034 | 18039.02 |
| 8 | Austria | 1940 | 1934 | 3.03657 | 6341.034 | 18039.02 |
| 13 | Austria | 1943 | 1934 | 3.03657 | 6341.034 | 18039.02 |
| 42 | Italy | 1941 | 1940 | 3.23677 | 6426.125 | 10947.69 |
| 1 | Italy | 1943 | 1940 | 3.23677 | 6426.125 | 10947.69 |
| 1 | Italy | 1945 | 1940 | 3.23677 | 6426.125 | 10947.69 |
| 23 | Italy | 1945 | 1940 | 3.23677 | 6426.125 | 10947.69 |
| 4 | England | 1866 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 11 | England | 1866 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 1 | England | 1867 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 43 | England | 1867 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 24 | England | 1868 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 5 | Scotland | 1870 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 14 | England | 1871 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 50 | Scotland | 1871 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 5 | Scotland | 1871 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 30 | England | 1872 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 1 | England | 1872 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 2 | England | 1873 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 1 | England | 1874 | 1871 | 3.147289 | 6454.752 | 6156.969 |
| 3 | Austria | 1944 | 1951 | 3.39688 | 6524.008 | 9918.156 |
| 18 | Netherlands | 1898 | 1899 | 3.91538 | 6566.016 | 9800.671 |
| 1 | Netherlands | 1900 | 1899 | 3.91538 | 6566.016 | 9800.671 |
| 13 | Netherlands | 1905 | 1909 | 4.256 | 6580.842 | 11765.82 |
| 6 | Netherlands | 1912 | 1909 | 4.256 | 6580.842 | 11765.82 |
| 18 | Norway | 1937 | 1930 | 4.12727 | 6947.923 | 13644.01 |
| 18 | Netherlands | 1921 | 1920 | 4.34609 | 7069.376 | 12339.06 |
| 15 | Netherlands | 1924 | 1920 | 4.34609 | 7069.376 | 12339.06 |
| 13 | England | 1875 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 10 | England | 1876 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 15 | England | 1876 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 7 | England | 1877 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 7 | England | 1878 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 2 | England | 1879 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 10 | England | 1880 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 27 | England | 1882 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 1 | England | 1882 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 14 | Scotland | 1882 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 13 | Scotland | 1882 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 14 | Scotland | 1884 | 1881 | 3.307104 | 7072.934 | 7570.682 |
| 9 | Italy | 1949 | 1951 | 3.72146 | 7138.35 | 12761.33 |

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|---|---|---|---|---|---|---|
| 14 | USA | 1875 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 15 | USA | 1877 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 13 | USA | 1877 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 13 | USA | 1878 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 14 | USA | 1879 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 11 | USA | 1880 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 25 | USA | 1881 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 29 | USA | 1883 | 1880 | 4.26985 | 7261.42 | 8178.19 |
| 17 | France | 1940 | 1946 | 3.58543 | 7381.685 | 10506.15 |
| 1 | France | 1941 | 1946 | 3.58543 | 7381.685 | 10506.15 |
| 5 | France | 1942 | 1946 | 3.58543 | 7381.685 | 10506.15 |
| 2 | France | 1943 | 1946 | 3.58543 | 7381.685 | 10506.15 |
| 8 | France | 1949 | 1946 | 3.58543 | 7381.685 | 10506.15 |
| 5 | Denmark | 1907 | 1911 | 3.42929 | 7388.861 | 13501.25 |
| 3 | Denmark | 1908 | 1911 | 3.42929 | 7388.861 | 13501.25 |
| 12 | Denmark | 1909 | 1911 | 3.42929 | 7388.861 | 13501.25 |
| 35 | Denmark | 1913 | 1911 | 3.42929 | 7388.861 | 13501.25 |
| 9 | N. Zealand | 1946 | 1945 | 5.34572 | 7553.127 | 9629.495 |
| 20 | France | 1932 | 1931 | 3.24918 | 7589.567 | 7139.28 |
| 10 | France | 1935 | 1931 | 3.24918 | 7589.567 | 7139.28 |
| 15 | France | 1937 | 1931 | 3.24918 | 7589.567 | 7139.28 |
| 1 | France | 1937 | 1931 | 3.24918 | 7589.567 | 7139.28 |
| 1 | France | 1937 | 1931 | 3.24918 | 7589.567 | 7139.28 |
| 25 | Scotland | 1887 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 17 | England | 1889 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 1 | England | 1890 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 2 | England | 1890 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 1 | England | 1891 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 10 | England | 1891 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 31 | Scotland | 1892 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 8 | Scotland | 1895 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 1 | England | 1895 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 12 | England | 1895 | 1891 | 3.354688 | 7708.07 | 7592.202 |
| 3 | Germany | 1946 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 12 | Germany | 1946 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 27 | Germany | 1946 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 1 | Germany | 1946 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 5 | Germany | 1947 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 6 | Germany | 1947 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 6 | Germany | 1947 | 1950 | 4.71892 | 7722.348 | 9511.424 |
| 5 | Denmark | 1919 | 1921 | 3.8445 | 7850.532 | 15121.63 |
| 52 | Denmark | 1925 | 1921 | 3.8445 | 7850.532 | 15121.63 |
| 1 | Switzerland | 1903 | 1900 | 2.98145 | 8067.587 | 10138.7 |
| 1 | Netherlands | 1940 | 1940 | 4.97309 | 8162.808 | 2933.435 |
| 22 | Netherlands | 1940 | 1940 | 4.97309 | 8162.808 | 2933.435 |
| 2 | Netherlands | 1942 | 1940 | 4.97309 | 8162.808 | 2933.435 |
| 4 | Netherlands | 1943 | 1940 | 4.97309 | 8162.808 | 2933.435 |
| 22 | Canada | 1917 | 1921 | 4.52991 | 8335.335 | 15722.3 |

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|---|---|---|---|---|---|---|
| 5 | USA | 1886 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 24 | USA | 1886 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 17 | USA | 1886 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 100 | USA | 1887 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 5 | USA | 1888 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 12 | USA | 1890 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 14 | USA | 1891 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 21 | USA | 1892 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 10 | USA | 1893 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 5 | USA | 1894 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 15 | USA | 1894 | 1890 | 4.69551 | 8407.923 | 10447.05 |
| 51 | England | 1896 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 18 | England | 1897 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 3 | England | 1897 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 20 | England | 1897 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 8 | England | 1897 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 6 | England | 1898 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 1 | Scotland | 1898 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 14 | England | 1899 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 17 | England | 1900 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 1 | Scotland | 1900 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 24 | England | 1901 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 21 | England | 1901 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 1 | England | 1901 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 11 | England | 1901 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 16 | England | 1902 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 4 | England | 1903 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 3 | England | 1903 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 12 | England | 1905 | 1901 | 3.497289 | 8455.25 | 8593.278 |
| 5 | Canada | 1905 | 1901 | 3.54384 | 8618.027 | 12140.89 |
| 21 | England | 1906 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 14 | Scotland | 1909 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 7 | England | 1911 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 14 | England | 1912 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 15 | England | 1912 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 3 | England | 1913 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 16 | England | 1915 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 1 | England | 1915 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 6 | England | 1915 | 1911 | 3.593633 | 8702.555 | 9736.075 |
| 4 | Canada | 1927 | 1931 | 5.08163 | 8773.05 | 18172.23 |
| 27 | Canada | 1931 | 1931 | 5.08163 | 8773.05 | 18172.23 |
| 19 | Canada | 1932 | 1931 | 5.08163 | 8773.05 | 18172.23 |
| 10 | Canada | 1935 | 1931 | 5.08163 | 8773.05 | 18172.23 |
| 17 | Australia | 1930 | 1933 | 5.06061 | 8811.722 | 13683.81 |
| 28 | Australia | 1938 | 1933 | 5.06061 | 8811.722 | 13683.81 |
| 11 | Australia | 1939 | 1933 | 5.06061 | 8811.722 | 13683.81 |
| 1 | Scotland | 1916 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 20 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |

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|---|---|---|---|---|---|---|
| 25 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 13 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 7 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 13 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 11 | England | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 3 | Scotland | 1917 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 47 | Scotland | 1921 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 37 | England | 1922 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 1 | Scotland | 1922 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 8 | England | 1923 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 15 | Scotland | 1924 | 1921 | 3.776498 | 8890.124 | 9569.228 |
| 15 | Netherlands | 1927 | 1930 | 4.56688 | 8890.231 | 7830.018 |
| 1 | Netherlands | 1928 | 1930 | 4.56688 | 8890.231 | 7830.018 |
| 8 | Netherlands | 1929 | 1930 | 4.56688 | 8890.231 | 7830.018 |
| 1 | Denmark | 1935 | 1940 | 4.44635 | 9019.759 | 16350.07 |
| 7 | England | 1926 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 6 | England | 1928 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 13 | Scotland | 1928 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 11 | England | 1929 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 3 | Scotland | 1929 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 7 | England | 1930 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 3 | England | 1930 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 19 | England | 1931 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 11 | England | 1931 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 1 | England | 1932 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 11 | England | 1932 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 16 | Scotland | 1932 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 11 | England | 1936 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 17 | England | 1937 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 1 | England | 1939 | 1931 | 4.097198 | 9226.747 | 10577.87 |
| 7 | Sweden | 1935 | 1940 | 4.03988 | 9233.985 | 13585.28 |
| 5 | Sweden | 1938 | 1940 | 4.03988 | 9233.985 | 13585.28 |
| 12 | Sweden | 1942 | 1940 | 4.03988 | 9233.985 | 13585.28 |
| 14 | Canada | 1906 | 1911 | 3.85326 | 9320.048 | 12205.57 |
| 12 | Canada | 1913 | 1911 | 3.85326 | 9320.048 | 12205.57 |
| 1 | Switzerland | 1924 | 1920 | 4.31708 | 9744.254 | 13380.14 |
| 32 | Netherlands | 1945 | 1947 | 5.13505 | 9778.632 | 8363.116 |
| 1 | USA | 1895 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 4 | USA | 1895 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 10 | USA | 1896 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 27 | USA | 1897 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 11 | USA | 1897 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 26 | USA | 1897 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 10 | USA | 1898 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 9 | USA | 1898 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 14 | USA | 1900 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 16 | USA | 1900 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 12 | USA | 1900 | 1900 | 5.00403 | 9915.628 | 13177.18 |

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|---|---|---|---|---|---|---|
| 7 | USA | 1901 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 8 | USA | 1902 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 1 | USA | 1903 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 3 | USA | 1903 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 17 | USA | 1903 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 6 | USA | 1903 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 4 | USA | 1904 | 1900 | 5.00403 | 9915.628 | 13177.18 |
| 15 | France | 1950 | 1954 | 4.01901 | 10235.43 | 18058.08 |
| 6 | France | 1950 | 1954 | 4.01901 | 10235.43 | 18058.08 |
| 1 | Switzerland | 1939 | 1941 | 4.99173 | 11772.12 | 15318.64 |
| 15 | Switzerland | 1945 | 1941 | 4.99173 | 11772.12 | 15318.64 |
| 75 | USA | 1906 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 10 | USA | 1906 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 9 | USA | 1907 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 29 | USA | 1908 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 1 | USA | 1908 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 5 | USA | 1908 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 37 | USA | 1908 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 12 | USA | 1908 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 20 | USA | 1909 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 6 | USA | 1910 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 15 | USA | 1910 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 19 | USA | 1910 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 4 | USA | 1911 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 16 | USA | 1911 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 27 | USA | 1911 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 1 | USA | 1912 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 8 | USA | 1912 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 9 | USA | 1912 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 6 | USA | 1913 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 23 | USA | 1913 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 16 | USA | 1914 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 2 | USA | 1914 | 1910 | 5.27065 | 12249.72 | 15874.08 |
| 6 | Switzerland | 1926 | 1930 | 4.72014 | 12293.9 | 12349.1 |
| 6 | Switzerland | 1927 | 1930 | 4.72014 | 12293.9 | 12349.1 |
| 5 | Switzerland | 1928 | 1930 | 4.72014 | 12293.9 | 12349.1 |
| 12 | Switzerland | 1929 | 1930 | 4.72014 | 12293.9 | 12349.1 |
| 12 | Switzerland | 1931 | 1930 | 4.72014 | 12293.9 | 12349.1 |
| 5 | Canada | 1941 | 1941 | 5.67589 | 12562.16 | 16898.17 |
| 15 | USA | 1915 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 12 | USA | 1916 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 11 | USA | 1916 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 27 | USA | 1916 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 1 | USA | 1917 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 25 | USA | 1917 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 2 | USA | 1918 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 51 | USA | 1919 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 11 | USA | 1920 | 1920 | 5.73537 | 12606.4 | 19545.45 |

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|---|---|---|---|---|---|---|
| 11 | USA | 1921 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 10 | USA | 1921 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 7 | USA | 1921 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 7 | USA | 1921 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 4 | USA | 1922 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 18 | USA | 1922 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 11 | USA | 1922 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 26 | USA | 1922 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 6 | USA | 1924 | 1920 | 5.73537 | 12606.4 | 19545.45 |
| 40 | England | 1942 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 7 | England | 1943 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 3 | England | 1944 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 3 | England | 1944 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 4 | England | 1947 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 15 | England | 1947 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 9 | England | 1948 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 9 | England | 1948 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 1 | England | 1949 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 8 | England | 1950 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 14 | England | 1950 | 1951 | 4.4466 | 12853.99 | 13161.16 |
| 2 | Sweden | 1945 | 1950 | 4.20474 | 13167.8 | 20616.68 |
| 1 | Sweden | 1948 | 1950 | 4.20474 | 13167.8 | 20616.68 |
| 14 | USA | 1925 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 22 | USA | 1925 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 27 | USA | 1926 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 7 | USA | 1926 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 8 | USA | 1926 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 8 | USA | 1926 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 14 | USA | 1927 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 1 | USA | 1929 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 23 | USA | 1929 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 16 | USA | 1929 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 45 | USA | 1929 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 34 | USA | 1930 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 13 | USA | 1930 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 26 | USA | 1930 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 16 | USA | 1930 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 13 | USA | 1931 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 34 | USA | 1931 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 23 | USA | 1932 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 10 | USA | 1932 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 8 | USA | 1933 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 11 | USA | 1933 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 15 | USA | 1933 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 8 | USA | 1934 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 1 | USA | 1934 | 1930 | 6.59874 | 14157.88 | 21535.17 |
| 5 | Switzerland | 1946 | 1950 | 4.87812 | 14908.1 | 22356.51 |
| 21 | Switzerland | 1947 | 1950 | 4.87812 | 14908.1 | 22356.51 |

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|---|---|---|---|---|---|---|
| 10 | USA | 1935 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1936 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 11 | USA | 1936 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 16 | USA | 1936 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 10 | USA | 1936 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 9 | USA | 1937 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 8 | USA | 1938 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 19 | USA | 1939 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 10 | USA | 1939 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 20 | USA | 1940 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1940 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 12 | USA | 1940 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 13 | USA | 1941 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 4 | USA | 1941 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 4 | USA | 1941 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 27 | USA | 1941 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1941 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 11 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 8 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 10 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1942 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 2 | USA | 1943 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 15 | USA | 1943 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1943 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 14 | USA | 1943 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 16 | USA | 1943 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 5 | USA | 1944 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 17 | USA | 1944 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 1 | USA | 1944 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 7 | USA | 1944 | 1940 | 7.77414 | 15968.34 | 20769.65 |
| 11 | Canada | 1946 | 1951 | 6.07429 | 17270.56 | 21185.46 |
| 3 | Canada | 1948 | 1951 | 6.07429 | 17270.56 | 21185.46 |
| 15 | Canada | 1949 | 1951 | 6.07429 | 17270.56 | 21185.46 |
| 23 | USA | 1945 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 1 | USA | 1945 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 1 | USA | 1945 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 1 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 26 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 18 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 10 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 14 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 11 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 11 | USA | 1946 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 17 | USA | 1947 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 1 | USA | 1947 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 1 | USA | 1947 | 1950 | 8.57579 | 21820.9 | 22587.83 |

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|---|---|---|---|---|---|---|
| 26 | USA | 1947 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 17 | USA | 1948 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 7 | USA | 1948 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 13 | USA | 1948 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 17 | USA | 1949 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 19 | USA | 1949 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 10 | USA | 1950 | 1950 | 8.57579 | 21820.9 | 22587.83 |
| 16 | USA | 1950 | 1950 | 8.57579 | 21820.9 | 22587.83 |

## Appendix B

## The Bases of Regression #3, 4, and 5

| Y2 | Y3 | AvgX2 | AvgX1 | AvgX3 | lnAvgX4 |
|---|---|---|---|---|---|
| 17 | 17 | 8811.722 | 5.06061 | 13683.81 | 8.799511 |
| 39 | 19.5 | 8811.722 | 5.06061 | 13683.81 | 8.799511 |
| 54 | 27 | 3386.627 | 1.59734 | 4231.295 | 10.00532 |
| 38 | 9.5 | 4409.266 | 2.24854 | 5460.325 | 10.16447 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 1 | 4918.449 | 2.48786 | 6152.492 | 10.26123 |
| 26 | 26 | 4918.449 | 2.48786 | 6152.492 | 10.26123 |
| 20 | 10 | 4918.449 | 2.48786 | 6152.492 | 10.26123 |
| 16 | 16 | 4707.771 | 2.65904 | 24453.29 | 8.784927 |
| 11 | 5.5 | 4707.771 | 2.65904 | 24453.29 | 8.784927 |
| 52 | 17.33333 | 4707.771 | 2.65904 | 24453.29 | 8.784927 |
| 7 | 7 | 6341.034 | 3.03657 | 18039.02 | 8.817149 |
| 41 | 13.66667 | 6341.034 | 3.03657 | 18039.02 | 8.817149 |
| 16 | 8 | 6432.521 | 3.216725 | 13978.59 | 8.830835 |
| 3 | 3 | 2323.665 | 1.39364 | 2030.761 | 8.422442 |
| 23 | 23 | 2584.889 | 2.16433 | 2544.213 | 8.440744 |
| 12 | 12 | 2584.889 | 2.16433 | 2544.213 | 8.440744 |
| 1 | 1 | 3547.938 | 2.76724 | 3690.74 | 8.616495 |
| 21 | 21 | 4138.069 | 2.519 | 4169.941 | 8.711279 |
| 17 | 8.5 | 4419.044 | 2.77614 | 5212.681 | 8.812546 |
| 8 | 4 | 4885.511 | 3.1911 | 6286.582 | 8.90937 |
| 1 | 1 | 5307.007 | 3.5175 | 7740.873 | 8.908965 |
| 17 | 17 | 5606.95 | 3.72049 | 6163.57 | 8.998631 |
| 9 | 9 | 5606.95 | 3.72049 | 6163.57 | 8.998631 |
| 2 | 2 | 4747.868 | 0.37697 | 5223.512 | 8.213923 |
| 5 | 5 | 8618.027 | 3.54384 | 12140.89 | 8.588956 |
| 14 | 14 | 9320.048 | 3.85326 | 12205.57 | 8.882808 |
| 12 | 12 | 9320.048 | 3.85326 | 12205.57 | 8.882808 |
| 22 | 22 | 8335.335 | 4.52991 | 15722.3 | 9.08137 |
| 4 | 4 | 8773.05 | 5.08163 | 18172.23 | 9.247154 |
| 56 | 18.66667 | 8773.05 | 5.08163 | 18172.23 | 9.247154 |
| 5 | 5 | 12562.16 | 5.67589 | 16898.17 | 9.350884 |
| 29 | 9.666667 | 17270.56 | 6.07429 | 21185.46 | 9.547526 |
| 18 | 9 | 4731.551 | 2.69075 | 6608.761 | 7.682943 |
| 29 | 14.5 | 5702.478 | 3.16468 | 9113.485 | 7.803435 |
| 20 | 6.666667 | 7388.861 | 3.42929 | 13501.25 | 7.922986 |
| 35 | 35 | 7388.861 | 3.42929 | 13501.25 | 7.922986 |
| 5 | 5 | 7850.532 | 3.8445 | 15121.63 | 8.091321 |
| 52 | 52 | 7850.532 | 3.8445 | 15121.63 | 8.091321 |
| 1 | 1 | 9019.759 | 4.44635 | 16350.07 | 8.310661 |
| 103 | 14.71429 | 3604.067 | 2.180821 | 2444.009 | 10.09121 |
| 45 | 9 | 3604.067 | 2.180821 | 2444.009 | 10.09121 |
| 250 | 27.77778 | 3604.067 | 2.180821 | 2444.009 | 10.09121 |
| 189 | 21 | 3747.844 | 2.65823 | 3037.49 | 10.19429 |
| 93 | 15.5 | 3747.844 | 2.65823 | 3037.49 | 10.19429 |
| 170 | 24.28572 | 4740.073 | 3.299947 | 4090.74 | 10.21866 |
| 185 | 14.23077 | 4740.073 | 3.299947 | 4090.74 | 10.21866 |
| 60 | 20 | 5569.042 | 3.059513 | 4844.158 | 10.28807 |
| 229 | 19.08333 | 5569.042 | 3.059513 | 4844.158 | 10.28807 |
| 88 | 14.66667 | 6454.752 | 3.147289 | 6156.969 | 10.35965 |
| 116 | 14.5 | 6532.025 | 3.167266 | 6333.683 | 10.37294 |
| 51 | 8.5 | 7072.934 | 3.307104 | 7570.682 | 10.46139 |
| 69 | 13.8 | 7072.934 | 3.307104 | 7570.682 | 10.46139 |
| 45 | 11.25 | 7708.07 | 3.354688 | 7592.202 | 10.54033 |
| 63 | 10.5 | 7708.07 | 3.354688 | 7592.202 | 10.54033 |

| | | | | | |
|---|---|---|---|---|---|
| 139 | 13.9 | 8455.25 | 3.497289 | 8593.278 | 10.63441 |
| 108 | 13.5 | 8455.25 | 3.497289 | 8593.278 | 10.63441 |
| 35 | 17.5 | 8702.556 | 3.593633 | 9736.075 | 10.7204 |
| 62 | 8.857142 | 8702.556 | 3.593633 | 9736.075 | 10.7204 |
| 93 | 11.625 | 8890.124 | 3.776498 | 9569.228 | 10.7613 |
| 108 | 21.6 | 8890.124 | 3.776498 | 9569.228 | 10.7613 |
| 50 | 7.142857 | 9226.747 | 4.097198 | 10577.87 | 10.73792 |
| 58 | 11.6 | 9226.747 | 4.097198 | 10577.87 | 10.73792 |
| 29 | 9.666667 | 9226.747 | 4.097198 | 10577.87 | 10.73792 |
| 53 | 13.25 | 12853.99 | 4.4466 | 13161.16 | 10.82536 |
| 60 | 6.666667 | 12853.99 | 4.4466 | 13161.16 | 10.82536 |
| 19 | 19 | 3217.841 | 1.67637 | 6276.66 | 8.207674 |
| 17 | 17 | 3403.523 | 0.27034 | 3465.11 | 10.48523 |
| 38 | 7.6 | 3403.523 | 0.27034 | 3465.11 | 10.48523 |
| 21 | 10.5 | 3403.523 | 0.27034 | 3465.11 | 10.48523 |
| 108 | 21.6 | 3403.523 | 0.27034 | 3465.11 | 10.48523 |
| 81 | 13.5 | 3381.252 | 1.05599 | 3410.667 | 10.491 |
| 174 | 24.85714 | 3390.644 | 1.247744 | 3497.503 | 10.49543 |
| 16 | 8 | 3414.123 | 1.72713 | 3714.591 | 10.50644 |
| 31 | 7.75 | 3537.813 | 1.846355 | 3950.282 | 10.51227 |
| 33 | 8.25 | 3908.882 | 2.20403 | 4657.355 | 10.52956 |
| 12 | 6 | 3908.882 | 2.20403 | 4657.355 | 10.52956 |
| 16 | 8 | 4244.06 | 2.53461 | 4811.979 | 10.54884 |
| 112 | 12.44444 | 4244.06 | 2.53461 | 4811.979 | 10.54884 |
| 57 | 28.5 | 4627.58 | 2.75683 | 5787.714 | 10.55779 |
| 45 | 11.25 | 4627.58 | 2.75683 | 5787.714 | 10.55779 |
| 37 | 9.25 | 5502.15 | 2.921 | 7027.253 | 10.57735 |
| 88 | 12.57143 | 5346.977 | 2.942096 | 7050.737 | 10.57567 |
| 15 | 15 | 4415.941 | 3.06867 | 7191.639 | 10.56553 |
| 30 | 15 | 7589.567 | 3.24918 | 7139.28 | 10.62809 |
| 34 | 8.5 | 7537.597 | 3.333242 | 7980.998 | 10.63548 |
| 8 | 2.666667 | 7381.685 | 3.58543 | 10506.15 | 10.65733 |
| 29 | 9.666667 | 9284.182 | 3.874483 | 15540.77 | 10.66775 |
| 214 | 19.45455 | 1635.807 | 1.85554 | 1770.421 | 10.71826 |
| 47 | 9.4 | 1635.807 | 1.85554 | 1770.421 | 10.71826 |
| 259 | 23.54545 | 1690.872 | 1.892945 | 1797.595 | 10.73523 |
| 136 | 9.714286 | 1938.663 | 2.06127 | 1919.878 | 10.80825 |
| 234 | 19.5 | 1986.067 | 2.178915 | 2066.035 | 10.83138 |
| 78 | 19.5 | 2223.087 | 2.76714 | 2796.82 | 10.9396 |
| 157 | 15.7 | 2257.409 | 2.819573 | 2874.296 | 10.95468 |
| 53 | 8.833333 | 2566.305 | 3.29147 | 3571.579 | 11.08103 |
| 75 | 9.375 | 2566.305 | 3.29147 | 3571.579 | 11.08103 |
| 180 | 30 | 2271.51 | 3.563357 | 3932.885 | 11.05482 |
| 123 | 10.25 | 2124.113 | 3.6993 | 4113.538 | 11.04145 |
| 25 | 8.333333 | 2123.838 | 3.772323 | 3787.014 | 11.0571 |
| 103 | 20.6 | 2123.289 | 3.91837 | 3133.968 | 11.0877 |
| 71 | 10.14286 | 3410.082 | 4.03501 | 3198.579 | 11.14636 |
| 127 | 15.875 | 3410.082 | 4.03501 | 3198.579 | 11.14636 |
| 60 | 8.571428 | 7722.348 | 4.71892 | 9511.424 | 10.81617 |
| 1 | 1 | 2691.088 | 1.33599 | 1755.593 | 8.518991 |

| | | | | | |
|---|---|---|---|---|---|
| 6 | 6 | 633.468 | 2.08291 | 850.8654 | 9.769613 |
| 14 | 14 | 2746.589 | 3.33864 | 3508.573 | 9.065199 |
| 31 | 15.5 | 2746.589 | 3.33864 | 3508.573 | 9.065199 |
| 31 | 7.75 | 2784.29 | 3.476522 | 3384.452 | 9.082421 |
| 51 | 17 | 2897.392 | 3.89017 | 3012.092 | 9.132379 |
| 15 | 15 | 2897.392 | 3.89017 | 3012.092 | 9.132379 |
| 7 | 7 | 1157.246 | 0.46773 | 1776.374 | 12.63034 |
| 10 | 10 | 1134.79 | 0.60868 | 1788 | 12.73115 |
| 2 | 1 | 1134.79 | 0.60868 | 1788 | 12.73115 |
| 10 | 5 | 1554.987 | 0.9624 | 2533.438 | 12.78515 |
| 12 | 12 | 2321.667 | 3.9487 | 2889.114 | 7.995644 |
| 19 | 19 | 3291.894 | 0.14106 | 2403.325 | 9.988748 |
| 15 | 15 | 3291.894 | 0.14106 | 2403.325 | 9.988748 |
| 27 | 13.5 | 2955.054 | 0.53316 | 2655.357 | 10.19627 |
| 25 | 25 | 2632.133 | 0.9786 | 2602.862 | 10.25636 |
| 29 | 14.5 | 3624.306 | 1.64551 | 3803.208 | 10.38835 |
| 10 | 10 | 3624.306 | 1.64551 | 3803.208 | 10.38835 |
| 54 | 27 | 4535.78 | 1.99416 | 6035.161 | 10.45375 |
| 5 | 5 | 4236.312 | 2.37499 | 5465.404 | 10.54466 |
| 67 | 16.75 | 6426.125 | 3.23677 | 10947.69 | 10.69982 |
| 9 | 9 | 7138.35 | 3.72146 | 12761.33 | 10.76884 |
| 47 | 23.5 | 2081.798 | 1.10964 | 1909.83 | 10.59418 |
| 15 | 15 | 2848.883 | 2.39611 | 3362.716 | 10.81009 |
| 22 | 11 | 3341.122 | 6.14765 | 8620.198 | 11.329 |
| 88 | 88 | 4482.738 | 3.81719 | 6443.205 | 6.964136 |
| 9 | 9 | 7553.127 | 5.34572 | 9629.495 | 7.439559 |
| 7 | 3.5 | 3958.687 | 2.59166 | 4568.223 | 8.104402 |
| 15 | 15 | 5138.171 | 3.50635 | 6984.27 | 8.297295 |
| 44 | 44 | 6287.392 | 3.71994 | 7407.689 | 8.414495 |
| 91 | 18.2 | 6287.392 | 3.71994 | 7407.689 | 8.414495 |
| 19 | 9.5 | 6566.016 | 3.91538 | 9800.671 | 8.537388 |
| 13 | 13 | 6580.842 | 4.256 | 11765.82 | 8.675735 |
| 6 | 6 | 6580.842 | 4.256 | 11765.82 | 8.675735 |
| 33 | 16.5 | 7069.376 | 4.34609 | 12339.05 | 8.834045 |
| 24 | 8 | 8890.231 | 4.56688 | 7830.019 | 8.979291 |
| 23 | 11.5 | 8162.808 | 4.97309 | 2933.435 | 9.096499 |
| 38 | 12.66667 | 8701.416 | 5.027077 | 4743.329 | 9.122311 |
| 15 | 15 | 2850.842 | 2.78637 | 3693.585 | 7.503841 |
| 5 | 5 | 2850.842 | 2.78637 | 3693.585 | 7.503841 |
| 10 | 10 | 3042.407 | 3.24375 | 3965.944 | 7.550135 |
| 29 | 29 | 3932.924 | 3.70853 | 6769.295 | 7.714677 |
| 18 | 18 | 6947.923 | 4.12727 | 13644.01 | 7.942362 |
| 23 | 23 | 1457.279 | 1.8586 | 3789.945 | 10.26169 |
| 32 | 16 | 1457.279 | 1.8586 | 3789.945 | 10.26169 |
| 8 | 8 | 1457.279 | 1.8586 | 3789.945 | 10.26169 |
| 11 | 11 | 1457.279 | 1.8586 | 3789.945 | 10.26169 |
| 9 | 4.5 | 2022.602 | 3.79347 | 4958.387 | 10.11957 |
| 1 | 1 | 1796.679 | 1.03608 | 1947.576 | 8.692323 |
| 1 | 1 | 379.6423 | 0.98664 | 512.0197 | 9.556833 |
| 21 | 10.5 | 2121.57 | 0.76311 | 3321.589 | 11.84787 |

| | | | | | |
|---|---|---|---|---|---|
| 15 | 15 | 2121.57 | 0.76311 | 3321.589 | 11.84787 |
| 1 | 1 | 2121.57 | 0.76311 | 3321.589 | 11.84787 |
| 61 | 20.33333 | 1770.619 | 1.51199 | 2773.286 | 11.89838 |
| 23 | 7.666667 | 3086.654 | 2.02353 | 3704.562 | 12.0463 |
| 15 | 7.5 | 3086.654 | 2.02353 | 3704.562 | 12.0463 |
| 17 | 5.666667 | 3086.654 | 2.02353 | 3704.562 | 12.0463 |
| 29 | 5.8 | 3086.654 | 2.02353 | 3704.562 | 12.0463 |
| 13 | 13 | 3934.506 | 0.95246 | 5139.058 | 9.342772 |
| 8 | 8 | 6131.535 | 2.10362 | 5990.326 | 10.07912 |
| 7 | 7 | 4183.091 | 2.29809 | 5508.854 | 10.1613 |
| 2 | 2 | 3367.338 | 2.02375 | 2066.431 | 8.255309 |
| 33 | 16.5 | 2938.216 | 2.68775 | 1814.71 | 8.346879 |
| 34 | 17 | 3443.404 | 3.13648 | 3077.293 | 8.426393 |
| 9 | 9 | 4191.348 | 3.50225 | 4046.645 | 8.472823 |
| 14 | 14 | 4512.799 | 3.65873 | 4379.789 | 8.544225 |
| 1 | 1 | 5848.01 | 3.76716 | 6534.569 | 8.616133 |
| 10 | 10 | 5712.778 | 3.85967 | 10055.29 | 8.683385 |
| 7 | 7 | 9233.985 | 4.03988 | 13585.28 | 8.759512 |
| 5 | 5 | 9233.985 | 4.03988 | 13585.28 | 8.759512 |
| 12 | 6 | 11200.89 | 4.12231 | 17100.98 | 8.811056 |
| 1 | 1 | 13167.8 | 4.20474 | 20616.68 | 8.860073 |
| 5 | 5 | 6218.425 | 1.86681 | 7477.125 | 7.978654 |
| 9 | 9 | 6218.425 | 1.86681 | 7477.125 | 7.978654 |
| 1 | 1 | 8067.587 | 2.98145 | 10138.7 | 8.106213 |
| 1 | 1 | 9744.254 | 4.31708 | 13380.14 | 8.230577 |
| 29 | 7.25 | 12293.9 | 4.72014 | 12349.1 | 8.310415 |
| 12 | 12 | 12293.9 | 4.72014 | 12349.1 | 8.310415 |
| 1 | 1 | 11772.12 | 4.99173 | 15318.64 | 8.358197 |
| 15 | 15 | 11772.12 | 4.99173 | 15318.64 | 8.358197 |
| 5 | 2.5 | 14908.1 | 4.87812 | 22356.51 | 8.45914 |
| 12 | 12 | 5253.609 | 3.63375 | 5962.68 | 10.58991 |
| 13 | 13 | 5253.609 | 3.63375 | 5962.68 | 10.58991 |
| 42 | 8.4 | 5655.171 | 3.76097 | 6405.782 | 10.63764 |
| 66 | 13.2 | 7261.42 | 4.26985 | 8178.19 | 10.8086 |
| 54 | 27 | 7261.42 | 4.26985 | 8178.19 | 10.8086 |
| 163 | 27.16667 | 8407.923 | 4.69551 | 10447.05 | 11.04436 |
| 70 | 10 | 8838.696 | 4.783659 | 11227.09 | 11.10222 |
| 135 | 15 | 9915.628 | 5.00403 | 13177.18 | 11.23373 |
| 46 | 6.571429 | 9915.628 | 5.00403 | 13177.18 | 11.23373 |
| 238 | 19.83333 | 12249.72 | 5.27065 | 15874.08 | 11.42471 |
| 127 | 11.54545 | 12282.15 | 5.312897 | 16207.84 | 11.43824 |
| 140 | 17.5 | 12606.4 | 5.73537 | 19545.45 | 11.5644 |
| 136 | 12.36364 | 12888.49 | 5.892346 | 19907.21 | 11.59148 |
| 238 | 18.30769 | 14157.88 | 6.59874 | 21535.17 | 11.70502 |
| 133 | 13.3 | 14338.93 | 6.71628 | 21458.62 | 11.71308 |
| 117 | 10.63636 | 15968.34 | 7.77414 | 20769.65 | 11.78291 |
| 184 | 8 | 16731.72 | 7.878703 | 21006.81 | 11.80163 |
| 235 | 13.05556 | 21820.9 | 8.57579 | 22587.83 | 11.91822 |

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