# Project 1: A Linear Square Root Model for Predicting Winning Times
## May Neelon

| Test / Validation Files | Linear MSEs | Quadratic MSEs | Linear + SqRt MSEs |
|---|---|---|---|
| 2345 | 0.02432332981 | 0.02051474994 | 0.02049352669 |
| 1 | 0.1934270547 | 0.06631290354 | 0.06638608556 |
| 1345 | 0.04113260531 | 0.02796380861 | 0.02795545799 |
| 2 | 0.04120658974 | 0.03421232611 | 0.03423761365 |
| 1245 | 0.04409356341 | 0.0339777035 | 0.03398239328 |
| 3 | 0.0316328788 | 0.00888658088 | 0.008849129195 |
| 1235 | 0.03705126361 | 0.02735893425 | 0.02733225023 |
| 4 | 0.0633000457 | 0.03924168582 | 0.03936529379 |
| 1234 | 0.04172279696 | 0.03338544836 | 0.03339432476 |
| 5 | 0.07174781171 | 0.0196626752 | 0.01961539993 |
| Training Mean | 0.06533160645 | 0.09705187192 | 0.1120536602 |
| Testing Mean | 0.3261260438 | 0.1096565295 | 0.04936858888 |
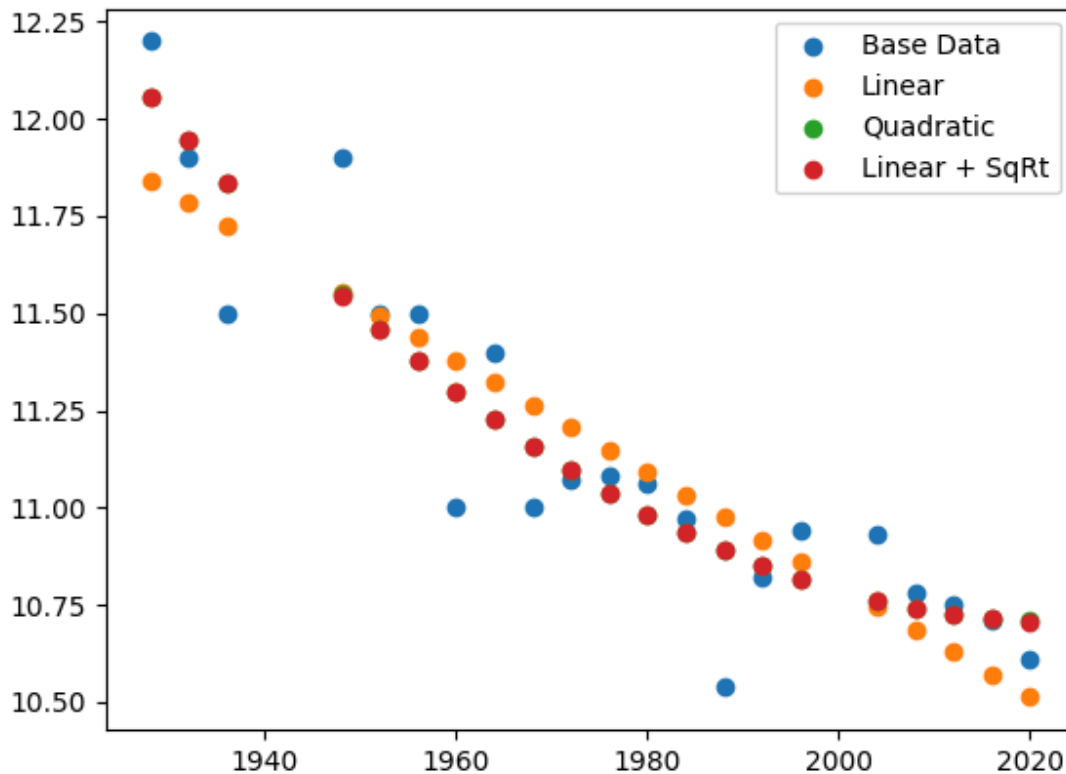
Based on this data, I would expect the combination linear and square root model to most accurately predict future times. It very closely follows the values of the quadratic model, and both models are better fits for the data than the linear model, as seen in the chart. However, the testing mean for the linear and square root model was much lower than for the quadratic model, implying that the combination better matches the underlying model than the quadratic does. Additionally, computing square roots to compute future values is not that computationally intense, and so I believe that the slightly more complicated model is worth it for the higher accuracy. I will therefore be using the linear and square root model to predict future times.