

The Sports Analyst Assignment

Jake Choi
AP Calculus BC (Period 2)
September 2, 2022

The Situation: You are a sports analyst working for a prestigious company called “**The Sky is the Limit**”. Your expertise in Calculus, especially the calculation of limits is needed for your country’s athletes to excel in the 2024 Summer Olympics to be held in Paris or the 2026 Winter Olympics to be held in Milan.

The Facts: A considerable number of world records were broken in the 2022 Olympics in Tokyo and 2022 Olympics in Beijing. Will these records continue to be broken in the next Olympics or has a limit been reached as to how fast a human can run/swim/skate in a particular event.

My Task:

Name of Event: Men’s 100m Freestyle Swimming

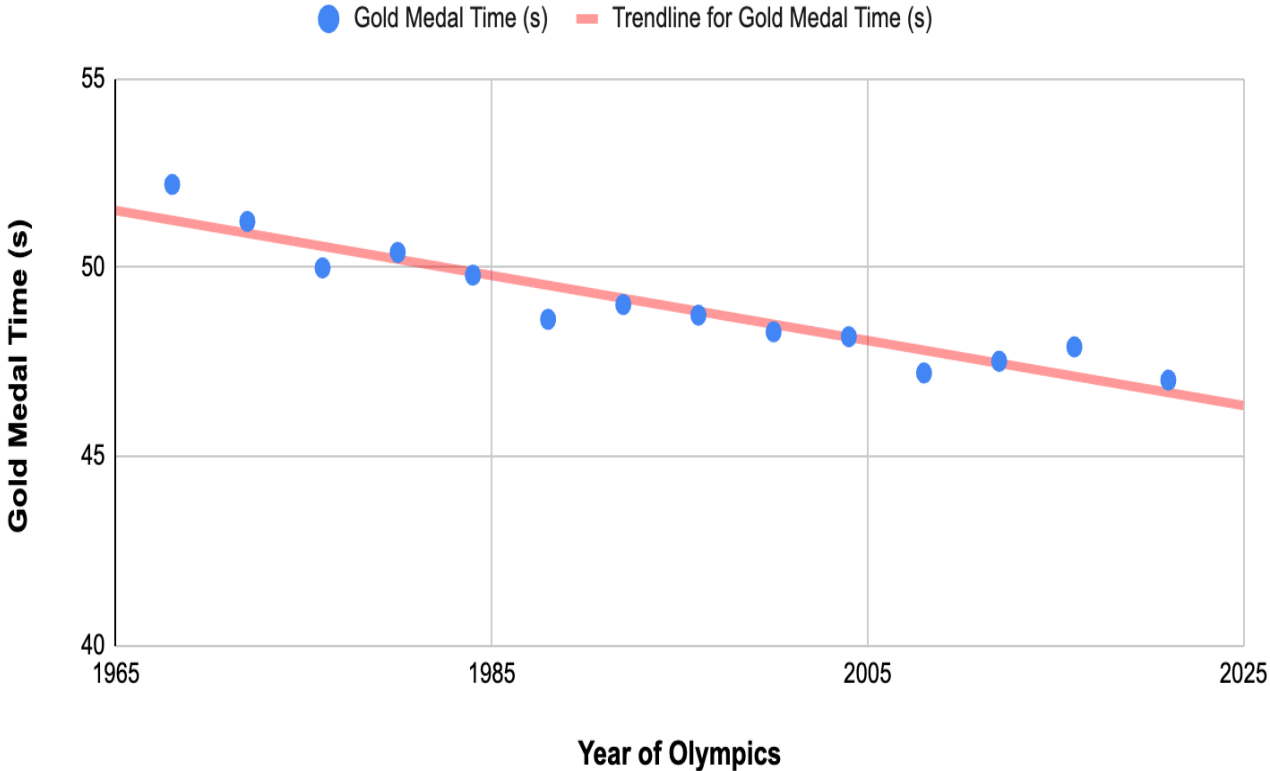
(a) Tabulate (put into a chart) the fastest times from previous Olympic games.

Year of Olympics	Location	Gold Medal Time (s)
1968	Mexico City, Mexico	52.2
1972	Munich, Germany	51.22
1976	Montreal, Canada	49.99
1980	Moscow, Soviet Union	50.4
1984	Los Angeles, United States of America	49.8
1988	Seoul, Republic of Korea	48.63
1992	Barcelona, Spain	49.02
1996	Atlanta, United States of America	48.74
2000	Sydney, Australia	48.3
2004	Athens, Greece	48.17
2008	Beijing, China	47.21

2012	London, United Kingdom of Great Britain and Northern Ireland	47.52
2016	Rio de Janeiro, Brazil	47.9
2021	Tokyo, Japan	47.02

(b) Plot a 1/2 page graph of your data and extrapolate the graph to 2024 or 2022.

World Records of Men's 100m Freestyle Swimming in the Olympics



(c) Use your graphing calculator to obtain the best-fit mathematical model for your function and use the model to estimate the time in 2024 or 2022.

As t is the Year of Olympics and $S(t)$ is the approximate Gold Medal Time (s) according to the year t , the best-fit mathematical model for the Gold Medal Time (s) of Men's 100m Freestyle Swimming in the Olympics is:

$$S(t) = -0.086 * t + 221$$

Approximate time record in 2024: $S(2024) = -0.086 * (2024) + 221 = 46.936$

In conclusion, the estimated Gold Medal Time (s) of Men's 100m Freestyle Swimming in the 2024 Paris Olympics would be 46.936 seconds.

(d) Examining both your graph and the mathematical model, comment on the feasibility of an athlete actually attaining the time(s) you predicted.

Examining both my graph in part (b) and the mathematical model in part (c), I believe it is highly feasible for an athlete to attain 46.936 seconds in Men's 100m Freestyle Swimming at the 2024 Paris Olympics. First, my predicted record of 46.936 seconds in Men's 100m Freestyle Swimming was actually broken recently. In the European Aquatics Championship held on August 13, 2022, in Rome, Italy, an athlete named David Popovici recorded 46.86 seconds in Men's 100m Freestyle Swimming. Second, swimmers have several methods to increase their speed. For example, they could balance their body and minimize energy consumption due to body torque. Furthermore, they could stretch their bodies more or turn their bodies sideways to reduce water resistance. Considering the fact that the predicted record from my graph and mathematical model is already broken in the European Aquatics Championship and that swimmers are working hard to apply several methods to increase their speed, it is highly feasible that 46.936 seconds is highly possible to be attained in Men's 100m Freestyle Swimming at the next 2024 Paris Olympics.