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MAT-150-002L

Option 2 Research

I'm going to track the population growth of Japan. I chose this one because I didn't think we covered this one in class and because I am Japanese and thought it would be cool. It will be modeled using an exponential model.

#	Years	Population (In Millions)
0	1840	31.66
1	1850	32.74
2	1860	33.23
3	1870	34.58
4	1880	36.98
5	1890	40.29
6	1900	44.42
7	1910	49.88
8	1920	56.33
9	1930	64.67

(Numbers in millions)

Roser, Max, et al. "Population." Our World in Data, 2023, https://ourworldindata.org/grapher/population?time=1700..latest&country=~JPN. Accessed 31 Mar. 2025.

The growth per 10 years there is 8.26% or .0826 per decade

The exponential growth model is $P(t) = 31.66(1 + 0.0826)^t$

A. The growth rate of Japan's population is 8.26% per decade, if the initial population was 31.66 million in 1840, find the population in the year 1970.

B. When would the population reach 122 million?

A. ~88.9 Million people
B. 2010

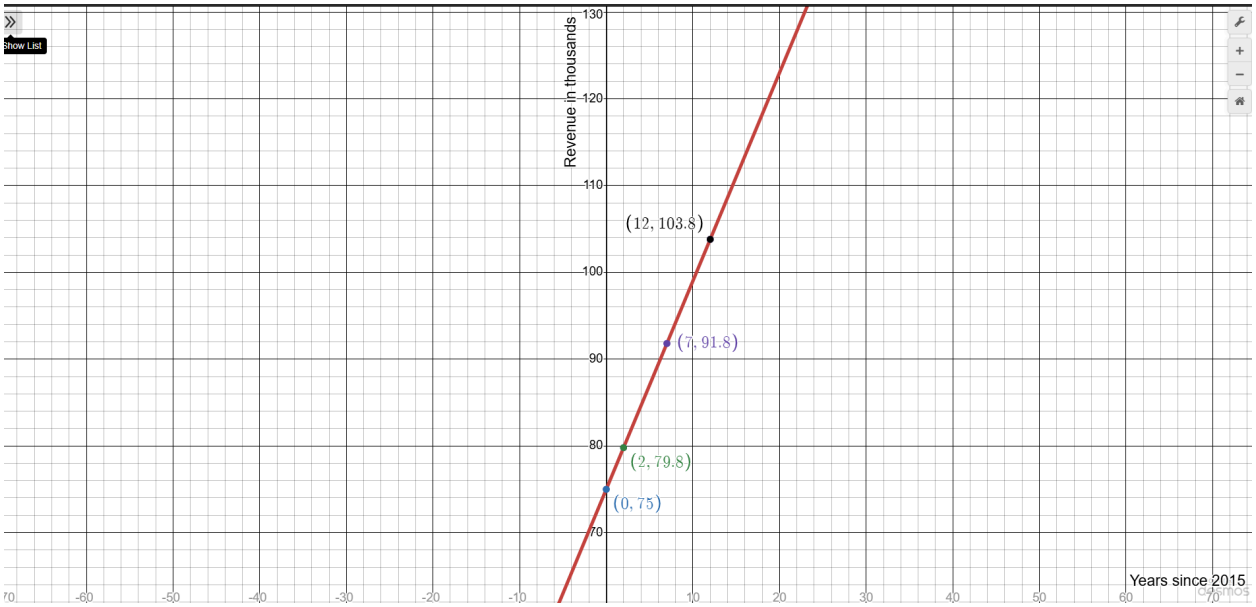
This data may not follow this model forever because there are many different variables for population growth. These could include political and social issues like wars, economic influences, as well as healthcare advances. There are too many variables to keep this model 100% accurate forever.

Option 1 An Original Problem

You're the owner of a new coffee shop, when you opened in 2015 you made $75,000 in revenue since then your revenue has increased by $2,400 every year.

A. What is the linear model for this data?
B. What will the revenue be in 2024?
C. When will your revenue be 111,000?

A. R(x) = 75000 +2400x
B. R(9) = 75000 + 2400(9) = R(9) = 75000 + 21600 = 96600. So the answer would be the revenue would be $96,600 in the year 2024
C. 111000 = 75000 + 2400x. 111000 - 75000 = 2400x. 36000 = 2400x. x = 36000/2400 x = 15. 2015 + 15 = 2030. So revenue would reach $111,000 in the year 2030.



Graph created using Desmos Graphing Calculator (https://www.desmos.com/calculator)