Predicted population for 2000; 203 e. 30k \approx 283.8

Actual: 281

\[ \text{To find k, let } t = 10. \quad 227 = P(10) = 203e^{10k} \]

\[ 10k = \ln\left(\frac{227}{203}\right) \]

\[ k = \frac{1}{10} \ln\left(\frac{227}{203}\right) = \ln(1.1101) \approx 0.041 \text{ yr}^{-1} \]

\[ \text{Thus, } P(t) = P_0e^{kt} = 203e^{0.041t} \]

US population in 1970 = 227 million

1980 = 227 million
Ex. If you earn a continuous interest rate of 9% per year, and you want $1,000,000 after 40 years, how much principal do you need to invest?

\[ 10^6 = M(40) = M_o e^{40r} = M_o e^{(0.09)(40)} = M_o e^{3.6} \]

\[ M_o = \frac{10^6}{e^{3.6}} \approx 27,320 \]
2744 = 280 days

\[
f(t) = \frac{Kt}{Kt + \frac{K}{4}}
\]

\[
f(4) = \frac{2}{1.2}
\]

Q: From a long half-life of 2598 years, how long?

\[
f(t) = \frac{Kt}{Kt + \frac{K}{3/4}}
\]

\[
f(4) = \frac{2}{1.2}
\]

Q: How long until 75% of original remains?

\[
f(t) = -\ln(2) \cdot \frac{1}{t} = -0.0041951 \text{ day}^{-1}
\]

Ex. Problem: A 210 has a half-life of 140 days.