

Name _____

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Exponential Models (3.5)



I can use exponential growth and decay functions to model and solve problems.

Exponential Growth Model: $y = ae^{bx}$

Exponential Decay Model: $y = ae^{-bx}$

The number N of bacteria in a culture is given by the model $N = 175e^{kt}$ where t is time in hours. If $N = 420$ when $t = 8$, estimate the time required for the population to double in size.

The populations P (in thousands) of Pineville, NC from 2006 through 2012 can be modeled by $P = 5.4e^{kt}$, where t is the year, with $t = 6$ corresponding to 2006. In 2008, the population was 7000. Find the value of k in the model and use the model to predict the population in 2018.

The populations P (in thousands) of Pittsburgh, PA from 1990 through 2004 can be modeled by $P = 372.55e^{-0.01052t}$, where t is the year, with $t = 0$ corresponding to 1990. According to the model, was the population increasing or decreasing from 1990 to 2004? According to the model, when was the population approximately 300,000?

A certain type of bacteria, given a favorable growth medium, doubles in population every 6.5 hours, following the law of exponential growth, $f(t) = ae^{bt}$. Given that there were approximately 100 bacteria to start with, how many bacteria will there be in 3 days?