

Name: _____

Exponential Population Growth

The equation for population growth is: $N = S * \lambda^t$

N is the new population; S is the starting population; λ is the growth rate, and t is time

1) A species of mouse is released onto the island of Hawaii. In the beginning, there are only 2 mice. However, every month, each mouse will have about 2 children.

(a) Write out the equation to calculate the number of mice on Hawaii in 24 months.

(b) Calculate how many mice there will be in 24 months (you may want to use a calculator).

(c) Does it seem realistic that there will be this many mice on Hawaii in 24 months? Why or why not?

2) An endangered turtle species has a population growth rate of $\lambda = 0.9$ per year. There are currently 300 turtles left in the wild.

(a) Write down the equation to calculate the number of turtles in 5 years.

(b) Calculate the number of turtles in 5 years (round to the nearest 1 turtle).

3) According to the 2010 census, the city of Tucson has 520,740 people in it. The population is growing at about 2% per year (so $\lambda = 1.02$).

(a) How many years is it between 2010 and 2050?

(b) Write down an equation to calculate the population of Tucson in 2050.

(c) What will the population of Tucson be in the year 2050? (round to the nearest 1000)

(d) Do you think that Tucson's population will be this big in 2050? Why or why not?

ANSWER KEY

1) A species of mouse is released onto the island of Hawaii. In the beginning, there are only 2 mice. However, every month, each mouse will have about 2 children.

(a) Write out the equation to calculate the number of mice on Hawaii in 24 months.

$$N=2*2^{24}$$

(b) Calculate how many mice there will be in 24 months (you may want to use a calculator).

16,777,216 mice

(c) Does it seem realistic that there will be this many mice on Hawaii in 24 months? Why or why not?

This is probably more mice than could fit. In other words, it is likely above the carrying capacity, so mice will start dying at a higher rate.

2) An endangered turtle species has a population growth rate of $\lambda = 0.9$ per year. There are currently 300 turtles left in the wild.

(a) Write down the equation to calculate the number of turtles in 5 years.

$$N=300*(0.9)^5$$

(b) Calculate the number of turtles in 5 years (round to the nearest 1 turtle).

177 turtles

3) According to the 2010 census, the city of Tucson has 520,740 people in it. The population is growing at about 2% per year (so $\lambda = 1.02$).

(a) How many years is it between 2010 and 2050?

40 years

(b) Write down an equation to calculate the population of Tucson in 2050.

$$N=520,740*1.02^{40}$$

(c) If current growth continues, what will the population of Tucson be in the year 2050? (round to the nearest 1000)

1,150,000 (exact answer: 1,149,814.574)

(d) Do you think that Tucson's population will be this big in 2050? Why or why not?