MAT 171 Homework Section 4.5: Exponential Growth and Decay; Modeling Data

Name: _____

1) Japan's population, A, in millions, t years after 2010 is modeled by the equation: $A = 127.3e^{-0.006t}$. What was teh population of Japan in 2010?

2) India's population, A, in millions, t years after 2010 is modeled by the equation: $A = 1173.1e^{0.008t}$. When will India's population be 1377 million?

3) In 2000, the population of Israel was approximately 6.04 million and by 2050 it is predicted to grow to 10 million.

   a) Use the exponential growth model, $A = A_o e^{kt}$, in which t is the number of years after 2000, to find an exponential growth model that fits the data.

   b) In which year will Israel's population be 9 million?

4) In 2010, the population of the Philippines was approximately 99.9 million. Based on a projected growth rate, k, of 0.0095, what will the projected population be in 2050 (in millions)? Round to one decimal place.

5) Prehistoric cave paintings were discovered in a cave in France. The paint contained 15% of the original carbon-14. The exponential decay model for carbon-14 is $A = A_o e^{-0.000121t}$. Estimate the age of the paintings.

6) For the radioactive substance Tritium, the rate of decay, k, is 5.5% per year $= -0.055$. What is the half-life? (Round to one decimal place)

7) For the radioactive substance Arsenic-75, the half-life is 17.5 days, what is the rate of decay, k? (Round to six decimal places)

8) Xanax is a tranquilizer used in the short-term relief of symptoms of anxiety. Its half-life in the bloodstream is 36 hours. How long will it take for Xanax to decay 90% of its original dosage?

9) The growth model $A = 4.3e^{0.01t}$ describes New Zealand's population, A, in millions, t years after 2010.

a) What is New Zealand's growth rate?

b) How long will it take New Zealand to double its population?