1. In 1945, cats were introduced to the small island of Aoshima off of the coast of Japan to help control the rat population. In 1996, the population was 50. By 2005, the population had grown to 542. Consider the following questions.

   (a) Suppose that the population is growing *exponentially*. Find an exponential formula for the population of cats as a function of the number of years t since 1996.

   (b) Using your exponential model above, what is the projected population of cats on Aoshima in 2020?

   (c) Suppose that the population of cats is growing *linearly*. Find a formula for the population as a function of the number of years t since 1996.

   (d) Using your linear model, what is the projected population of cats on Aoshima in 2020?

2. You deposit $\$15,000$ into a bank account with an interest rate of 5.6% per year. When the amount of money in the account grows to $\$22,000$, you will immediately throw a *very* fancy party using these funds. Let t be the number of years since 2017.

   (a) If the interest is *compounded annually*, what year will your party be?

   (b) If the interest is *compounded continuously*, what year will your party be?

3. The data below gives the income generated by your small business (in thousands of dollars) for the past five years.

year	2012	2013	2014	2015	2016
sales	137	123	110	97	84

(a) The data above appears to follow a linear trend. Give an equation that models this data. State all units, and interpret the meaning of the slope and y-intercept of the line.

(b) Using the model above, determine what your income is projected to be in the year 2018.

(c) What year will you no longer be making money from your small business?

4. You have $\$10,000$ to invest with the goal of making as much money as possible in two years. You have the following two options:

   (a) Invest $\$10,000$ into an account in which interest compounds *annually* at a rate of 12.5%.

   (b) Invest $\$10,000$ into an account in which interest compounds *continuously* at a rate of 9.879%.

   Which option would you choose to make the most money?

   To receive credit you **must** *support your answer with relevant work.*