1. A pill is taken and the amount (in milligrams) of the drug in the body at time $t$ (in hours) is given by: $A(t) = 25(0.85)^t$.
   
   (a) What is the initial dose given? $25$ mg.
   (b) What percent of the drug leaves the body each hour? 15%
   (c) What is the amount of drug left after 10 hours? 4,922 mg.
   (d) If you want to maintain at least 10 mg of the drug in the body at all times, how often should you take a pill? $y_1 = 25(0.85)^x$, $y_2 = 10$, \( @ x = 5.638 \) hrs.
   \( \approx \) every 5 hrs.

2. Suppose that the annual inflation rate in a certain state is 3.5%.
   
   (a) If a movie ticket costs $7.50, find a formula for $P$, the price of the ticket $t$ years from today, assuming that movie tickets keep up with inflation and that the inflation rate stays constant. $P(t) = 7.50 (1.035)^t$.
   (b) According to your formula, how much will movie tickets cost in 20 years? $7.50 (1.035)^{20} = 14.92$.
   (c) When will the price of a movie double? 20.15 yrs.
   (d) When did a movie cost $5.00? \(-11.786 \) (about 12 yrs ago).

3. A colony of bacteria is growing exponentially. At the end of 3 hours there are 1000 bacteria. At the end of 5 hours there are 4000.
   
   \[ 4000 = 1000 \cdot b^2 \]
   
   (a) Write a formula for the population of bacteria at time $t$, in hours. $P(t) = 12.5 (2)^t$.
   (b) By what percent does the number of bacteria increase each hour? $P(t) = 12.5 (2)^t$.

4. At 12 noon, a bacteria colony was growing exponentially. The population was 12,000 at 3 pm and 15,000 at 5 pm. What was the population at 12 noon?
   
   (a) $15,000 = 12,000 e^b$.
   (b) $1.25 = b^2$.
   \( @ t = 0 \), $P_0 = 12,000$.

5. The earth's atmospheric pressure $P$ in terms of height above sea level is often modeled by an exponential decay function. Suppose the pressure at sea level is 1013 millibars (about 14.7 pounds per square inch) and that the pressure decreases by 14% for every kilometer above sea level.
   
   \[ P = 1013 \cdot (1.86)^km \]
   
   (a) What is the atmospheric pressure at 50 km?
   (b) Estimate the altitude $h$ at which the pressure equals 900 millibars. $y_1 = 1013 \cdot (1.86)^x$, $y_2 = 900$, \( \leftarrow \) 0.784 km.

6. The population of a colony of rabbits grows exponentially. The colony begins with 10 rabbits, and five years later there are 340 rabbits.
   
   \[ 340 = 10 \cdot b^5 \]
   
   (a) Give an equation for the population of the colony of rabbits as a function of the time.
   (b) Estimate how long it will take for the population of the colony to reach 1000 rabbits.
   (c) How long did it take for the population to double in size?

   \[ a) P(t) = 10 \cdot (2.0244)^t \]
   \[ b) y_1 = 10 \cdot (2.0244)^x, y_2 = 1000, \leftarrow 6.530 \text{ yrs.} \]
   \[ c) \quad y_2 = 20, \leftarrow 0.983 \text{ yrs.} \]