1. A herd of elk can increase in number by 15\% each year. Suppose there are currently 1000 elk in the herd.
   a. How many elk are in the herd after 20 years?
   b. When does the elk population first exceed 2000?
   c. Repeat parts (a) and (b) with the additional assumption that 50 elk are removed from the herd each year.
   d. What is the largest number of elk that can be removed from the herd each year to keep the herd from eventually dying out?
   e. What is the largest number of elk that can be removed from the herd each year while still allowing the herd to grow to at least 2000 over the next 20 years?

2. Suppose that a patient takes a 200 mg dose of a medication once every 8 hours, and consider the amount of the drug in the bloodstream at 8-hour increments as a discrete “population” model. From our work in class, we know that the percentage of drug remaining in the bloodstream at the end of an 8-hour time increment (before the next dose) is \( e^{-k(8)} \). In other words, the amount at the end of 8 hours is \( e^{-k(8)} \) times the amount at the beginning of that 8-hour period. Assume that \( N_0 \), the amount of drug after the first dose, is 200 and \( k = 0.05 \).
   a. Write the equation for \( N_1 \), the amount of drug in the bloodstream after 8 hours of decay, plus the addition of the next dose of 200 mg.
   b. How much drug is in the bloodstream just after the third dose?
   c. How many doses must the patient take before the amount of drug in the bloodstream first exceeds 500 mg?
   d. How many doses must the patient take before the amount of drug in the bloodstream is within 5 mg of the amount after the previous dose?
   e. Use Excel to make a graph of the amount of drug in the bloodstream every 8 hours, and print the graph.