

## MATH 203 WORKSHEET #12

- (1) Radioactive substance Z has a half-life of 10 years. You currently have 4 grams of Z. How much will you have 20 years from now? 25 years from now?
  
  
  
  
  
  
  
  
  
  
- (2) Steve generously loans you \$100 at 10% per week interest. How much will you owe him in 5 weeks
  - (a) if interest is on the principal only (not compounded)?
  - (b) if interest is compounded weekly?
  - (c) if interest is compounded continuously?
  
  
  
  
  
  
  
  
  
  
- (3) Mike raises mink, which reproduce exponentially. He currently has 50 mink in his garage, where a month ago he had only 40.
  - (a) How long does it take the number of mink to double?
  - (b) How many will he had a year from now?
  - (c) Does this same sort of reasoning apply to whales? Why?

- (4) Harry the Horse brings a cup of hot coffee into a cold room. The temperature of the coffee is (initially) 180 degrees, while the room is 50 degrees. Give the initial value problem describing this situation.
- (5) The late Mac the Knife is found at midnight with a body temperature of 90 degrees F, in a room where the temperature is 70. At 1 a.m. he has cooled to 80 degrees. When was he killed? Why?
- (6) The island of Beriberi (pop. 4000) has endemic "Poe's revenge," which carries no immunity. Measuring population in thousands and time in days, the rate at which healthy people (S) become ill (I) is  $.01SI$ , while the rate at which ill folk recover is  $.03I$ . At equilibrium, how many people are sick and how many healthy?