MATH FOR BUSINESS: CALCULUS, SPRING 2017 - PROBLEM SET 7

Name: _____

Use this worksheet as the cover sheet for your write-up: write your name on this page, and staple this sheet to the front of your homework packet.

You will receive no credit for submitting solutions that the grader cannot read and understand—be sure to write legibly!

Problem 1. Write a formula for a populations that is currently 46500 and
  (1) an increase by 2.4% a year.
  (2) an decrease by 2.4% a year.

Problem 2. A $5000 investment increase in value of 6.2% per year.
  (1) Write an equation for a function that gives the value of the investment after t-years.
  (2) What is the value of the investment after 7.5 years?
  (3) How long will it be until investment is worth $8000.

Problem 3. The eagle population in a state park is currently 1650 but is expected to decrease 18% per year.
  (1) Write an equations for the function that gives the number of eagles in the park after t-years from now.
  (2) Determine the time required for the population to be reduced to 1000.
  (3) What is the rate of change of the population after four years.

Problem 4. A population of viruses increasing at a constant relative growth rate in a bloodstream of its host. After three days the population increases from 260 to 1720.
  (1) Write a model for the viruses after t-days.
  (2) According to the model, how many viruses will be present after one week.
  (3) At what rate is the virus population increasing after one week.

Problem 5. The number of mountain lions in a wildlife preserve modeled by
$$P(t) = \frac{1680}{1 + 4.2e^{-0.011t}}$$
where t is the number of years after January 1, 2010.
  (1) What is the carrying capacity? How many mountain lions are there on January 1st 2010.
  (2) According to the model, what is the population after 15 years?
  (3) When does the model predict that the population will reach 1500?
  (4) Compute and interpret $P'(12)$?

Problem 6. Each side of a square is increasing at a rate of $6\frac{cm}{s}$. At what rate is the area of the square increasing when the area is 16cm?

Problem 7. Assume that x and y are functions of t. If $y = x^3 + 2x$ and $\frac{dx}{dt} = 5$, find $\frac{dy}{dt}$ when $x = 2$.