5.3 Optimization with Exponential Functions

For this section we will utilize what we know about finding critical values (setting a derivative to zero), and testing those critical values for max/min (by plugging the c.v. into the second derivative). We'll examine two problems from your text.

Example 5.3.1

From your text: Pg. 245 #3

The squirrel population in a small self-contained forest was studied by a biologist. The biologist found that the squirrel population, P, measured in hundreds, is a function of time, t, where t is measured in weeks. The function is $P(t) = \dfrac{20}{1 + 3e^{-0.05t}}$.

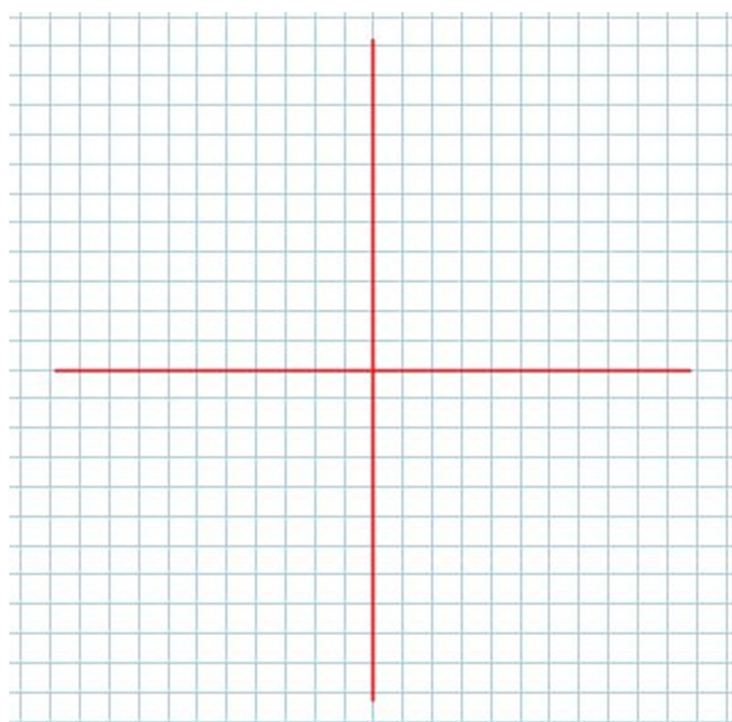
a. Determine the population at the start of the study, when $t = 0$.

b. The largest population the forest can sustain is represented mathematically by the limit as $t \to \infty$. Determine this limit.

c. Determine the point of inflection.

d. Graph the function.

e. Explain the meaning of the point of inflection in terms of squirrel population growth.



Example 5.3.2

From your text: Pg. 247 #12b

Determine the max and min values for the function $y = x \cdot e^{x} + 3$ (don't graph)

Class/Homework for Section 5.3

Pg. 245 – 247 #4, 6, 8, 12cd, 13