Math 36
Homework 01

Differential Equations: Exponential and Logistic Models

1. A culture of bacteria, *tham ithystrix*, obeys the exponential growth model. The initial population is 200. Ten minutes later, the population is 300.

   (a) Write down the equation for the population at time t. (Constants may be rounded to 4 decimal places.)

   (b) How many bacteria are there at time $t = 20$ minutes?

2. A branch has been broken off of a Hattormud tree. The branch currently has 33.7% the radioactivity of the (still living) tree. How long ago was the branch broken?

3. The island of Kikossmet has a carrying capacity of 1.2 million squirrels. Assume that the population grows according to the logistic model, and that 1,000 are initially introduced to the island. If the constant of proportionality appearing in the differential equation model is 2.8, how long will it take for the squirrel population to reach 90% capacity?