

Mathematics 110 — Assignment 10

Reading: Lecture Notes Sections 8.3 and 8.4

Question 1.

On a day when the air temperature is 35 degrees Celsius, a can of soft drink at a temperature of 4 degrees Celsius is taken from the fridge at 2:30 pm. Thereafter the temperature of the can satisfies the differential equation

$$\frac{dT}{dt} = 0.2(35 - T) ,$$

where t is the number of minutes after 2:30 pm. What is the temperature of the can at 2:35 pm? At what time does the temperature reach 30 degrees?

Question 2.

A rabbit population satisfies the logistic equation

$$\frac{dy}{dt} = 2 \times 10^{-7}y(10^6 - y),$$

where t is the time measured in months. The population is suddenly reduced to 20% of its steady state size by myxamatosis. If the myxamatosis then has no further effect, how large is the population 6 months later? How long will it take for the population to build up again to 90% of its steady state size?

Question 3.

Exercise 15(a),(b),(c), Section 8.5 of the lecture notes.