Math 118 – Week 4 Assignments  
Fall Term 2003  
BUCKMIRE

Monday September 15 Class 7:

We will continue our analysis of initial value problems with a variety of population growth models. Of particular interest is the Existence and Uniqueness Theorem for IVPs.

Reading:

Smith & Minton, p. 503-509, 516-518, p 512-514

Homework #5 (5 points):

Verify that the given formula is a solution to the initial value problem

(a) \( y' = y^2, y(0) = 5 \quad y(t) = 1/(5 - t) \)

(b) \( y' = y^3, y(0) = 5 \quad y(t) = 1/\sqrt[3]{1 - t} \)

(c) \( y' = y^4, y(0) = 5 \quad y(t) = 1/\sqrt[4]{1 - 125} \)

(d) Write a general formula for the solution \( y(t) \) to the initial value problem \( y' = y^n, y(0) = C \) for any integer \( n > 1 \) and any constant \( C \geq 0 \)

(e) Write a general formula for the solution \( y(t) \) to the initial value problem \( y' = t^n, y(0) = C \) for any integer \( n > 1 \) and any constant \( C \geq 0 \)

Due: Class 8

Wednesday September 17 Class 8:

We will continue with more challenging initial value problems based on Newton’s Law of Cooling.

Reading:

Smith & Minton, p. 506-508

Homework #6 (4 points):

Complete the handout on the initial value problem concerning glucose infusion.

Due: Class 9

Thursday September 18 Lab #2: Newton’s Method

Topic: We will construct Newton’s method as applied to a general function. With this in hand, we will compare this method to the Babylonian method for finding square roots and reciprocals.

Friday September 19 Class 9:

We will begin the discussion of local linearity and its relation to the definition of a derivative. We’ll construct the “microscope equation” and demonstrate its uses in estimation and error analysis.

Reading:

Smith & Minton, p. 170–171

Homework:

Quiz # 3: The Microscope Approximation

Due: Class 10