

MATH 146 Syllabus, Spring, 2006

Week	Section	Topics
I	51, 33	Differential Equations, Stability
II	33, 34, 35	Differential equations, Growth Models,
III	37	Differential Equations
IV	53	Vectors, Matrices
V	55	Systems of Linear Equations
VI	56	Matrices, Leslie Matrices
VII	56	Compartment Models
VIII	-	Eigenvalues and Eigenvectors
IX	39	Linear Systems

M146 Assignment I Due Thur March 30, 2006

Section 51 (page 579) 52-56, 58-62

Section 33 (page 368) 3, 14

(1) Find the steady state values for the following equations, and for each steady state value determine whether it is stable or unstable.

(1a) $\frac{dy}{dt} = 2(y - 3)$

(1b) $\frac{dy}{dt} = 5(6 - y)$

(1c) $\frac{dy}{dt} = 2y(y - 1)$

(1d) $\frac{dy}{dt} = y(y^2 - 3)$

(1e) $\frac{dy}{dt} = .8y(y - .7)^2$

(2) Same equations as (1). In each case, determine the behavior as $t \rightarrow +\infty$ of the solution with the initial condition listed. Do this without solving the equation for y .

(2a) $\frac{dy}{dt} = 2(y - 3) \quad y(0) = 4$

(2b) $\frac{dy}{dt} = 5(6 - y) \quad y(0) = 2$

(2c) $\frac{dy}{dt} = 2y(y - 1), \quad y(0) = .5$

(2d) $\frac{dy}{dt} = 2y(y - 1), \quad y(0) = 2$

(2e) $\frac{dy}{dt} = y(y^2 - 3), \quad y(0) = 1.5$

(2f) $\frac{dy}{dt} = .8y(y - .7)^2, \quad y(0) = .5$

M146 Sample Quiz #01 for Thursday, March 30, 2006

(1) Find the steady state values for the following equation, and for each steady state value determine whether it is stable, or unstable.

$$\frac{dy}{dt} = 2y(y^2 - 4)(100 - y)$$

(1b) If $f(0) = 1$, what is $\lim_{t \rightarrow \infty} f(t)$?

(1c) If $f(0) = 10$, what is $\lim_{t \rightarrow \infty} f(t)$?

(1d) If $f(0) = 200$, what is $\lim_{t \rightarrow \infty} f(t)$?

(2a) Find the solution $\frac{dy}{dt} = -2y + 10$, $y(0) = 4$.

(2b) What is $\lim_{t \rightarrow \infty} y(t)$?

(2c) At what time does y reach 90 % of its steady state value?

(3a) Suppose $y = f(t)$ is the solution to $\frac{dy}{dt} = -.2y(1 - y)$, with $y(0) = .5$. What is $\lim_{t \rightarrow \infty} f(t)$?

(3b) Use separation of variables (and formula # 69 of text) to solve the differential equation of (3a) .

(3c) At what time does y reach 95 % of its steady state value?