Assignment Set 4, G63.2470, Spring 2009

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The following assignments are due on March 25 at midnight, but will be accepted up to one week late.

1. Problem 1 in chapter 1 of Coddington and Levinson.
2. Problem 1 in chapter 15 of Coddington and Levinson.
3. Problem 2 in chapter 15 of Coddington and Levinson.
4. Study the stability of the zero solution of

$$x' = \ln(4y + e^{-3x}), \quad y' = 2y - 1 + (1 - 6x)^{1/3}.$$

5. For which values of a is the zero solution of

$$x' = ax - 2y + x^2, \quad y' = x + y + xy$$

asymptotically stable?

6. Study the stability of the zero solution of

$$x' = y - x + xy, \quad y' = x - y - x^2 - y^3.$$

7. Is the solution $x = t^2,\ y = t$ of

$$x' = y^2 - 2ty - 2y - x,\ y' = 2x + 2t^2 + e^{2t-2y}$$

stable?

8. Study the stability of the zero solution of

$$y^{(5)} + 2y^{(4)} + 5y^{(3)} + 6y'' + 5y' + 2y = 0.$$

Solve the following equations:

9.

$$x''' = 3xx',\ x(0) = -2,\ x'(0) = 0,\ x''(0) = 9/2.$$

10.
$$x'' + 2x' + x = 3e^{-t}\sqrt{t+1}.$$

11.
$$x'' - \frac{2x}{t^2} = 3\ln(-t).$$

12.
$$t^3x'' - 2tx = 6\ln(t).$$