



MATH 308: WEEK-IN-REVIEW 4
SHELVEAN KAPITA

1. Solve the initial value problems

(a)

$$y'' - 7y' + 12y = 0, \quad y(0) = 3, \quad y'(0) = -2.$$

(b)

$$y'' + 4y' + 4y = 0, \quad y(0) = 1, \quad y'(0) = 3.$$



(c)

$$y'' + 4y' + 20y = 0, \quad y(0) = 3, \quad y'(0) = -1.$$

2. Find the initial value problems (equations and initial conditions) that have the solutions

(a)

$$y(t) = 2e^{4t} + e^{-6t}$$



(b)

$$y(t) = e^{-3t} + 2te^{-3t}$$

(c)

$$y(t) = 2e^{-t/2} \cos(3t) + e^{-t/2} \sin(3t)$$



3. Verify that $y_1 = \cos(\ln x^2)$ and $y_2 = \sin(\ln x^2)$ are solutions of the differential equation

$$x^2 y'' + xy' + y = 0.$$

Do they constitute a fundamental set?



4. Suppose $y_1 = t^{-1/2}$ is a solution of the differential equation

$$4t^2y'' + 8ty' + y = 0, t > 0.$$

Determine a second linearly independent solution y_2 .



5. If the differential equation

$$3t^2y'' - 2ty' - 5y = 0, \quad t > 0$$

has a fundamental set of solutions y_1 and y_2 and $W(y_1, y_2)(1) = 5$, find the value of $W(y_1, y_2)(8)$.



6. Find a general solution of

$$4t^2y'' + 4ty' + (36t^2 - 1)y = 0$$

given that $y = t^{-1/2} \cos(3t)$ is one solution.