

Assignment 3

1. Show how Theorem 6.1 works for the d.e.

$$y'' = 2$$

with initial conditions $y(0) = y'(0) = 0$.

2. Find the general solution of

$$y'' + n^2 y = \cos mx \quad , \quad m, n \text{ constant}$$

and the solution satisfying the initial conditions $y(0) = 1$ and $y'(0) = 0$.

3. Verify that $y_1 = e^{-2x}$ is a solution of the d.e.

$$(2x + 1)y'' + (4x - 2)y' - 8y = 0$$

and find another solution y_2 such that y_1 and y_2 are linearly independent.

4. Verify that $y_1 = \frac{1}{x}$ is a solution of the d.e.

$$(4x^2 - x)y'' + 2(2x - 1)y' - 4y = 0.$$

Find the general solution of the d.e.

$$(4x^2 - x)y'' + 2(2x - 1)y' - 4y = 12x^2 - 6x.$$

5. * Solve the **non**-linear initial value problem

$$y'' = \frac{y'}{x} + \frac{x^2}{y'} \quad , \quad y(2) = 0 \quad , \quad y'(2) = 4$$

[Hint: First find $(y')^2$.]