



ISRA UNIVERSITY

Islamabad Campus

Semester – Spring 2019

Solution

Calculus-II

Assignment – 4

Marks: 10

Due Date: 14/05/2019

Handout Date: 07/05/2019

Question # 1:

Solve the 2nd order homogeneous differential equation:

$$y'' - 2y' + y = 0$$

Solution:

The characteristic equation will be:

$$\lambda^2 - 2\lambda + 1 = 0$$

Using Quadratic equation:

$$\lambda = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\lambda = \frac{2 \pm \sqrt{2^2 - 4(1)}}{2}$$

$$\lambda = \frac{2 \pm \sqrt{4 - 4}}{2} = \frac{2 \pm 0}{2}$$

$$\lambda = \frac{2}{2} \Rightarrow 1$$

It has double root: $\lambda = 1$

Then the general solution is:

$$y(x) = (c_1 + c_2 x)e^{-0.5x}$$

Question # 2:

Solve the 2nd order homogeneous differential equation:

$$y'' + 25y = 0$$

Solution:

The characteristic equation will be:

$$\lambda^2 + 25 = 0$$

Using Quadratic equation:

$$\lambda = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\lambda = \frac{-0 \pm \sqrt{0^2 - 4(25)}}{2}$$

$$\lambda = \frac{\pm\sqrt{-100}}{2} = \frac{\pm i10}{2}$$

$$\lambda_1 = \frac{i10}{2} \Rightarrow 5, \lambda_2 = \frac{-i10}{2} \Rightarrow -5$$

Then the general solution is:

$$y(x) = e^{-(0)x}(A \cos 5 + B \sin 5)$$

$$y(x) = (A \cos 5 + B \sin 5)$$

Good Luck