Tutorial 6

Question 1

Show that the differential equation is homogeneous and solve it.

$$xy' = \frac{y^2}{x} + y$$

Question 2

Show that the differential equation is homogeneous and solve it.

$$(x^2 - 3y^2)dx + 2xydy = 0$$

Question 3

Show that the differential equation is homogeneous and solve it.

$$\frac{dy}{dx} = \frac{x - 2y}{x}$$

Question 4

Show that the following equation is exact then solve the following IVP.

$$cosx - 2xy + (e^y - x^2)y' = 0 \qquad\qquad y(1) = 4$$

Question 5

Show that the following equation is exact then solve it.

$$(x + siny)dx + (xcosy - 2y)dy = 0$$

Question 6

Find the integrating factor then solve the following equation.

$$\frac{y}{x^2} + 1 + \frac{1}{x}\frac{dy}{dx} = 0$$

Question 7

Find the integrating factor then solve the following equation.

$$2xydx + (y^2 - 3x^2)dy = 0$$

Question 8

Solve the following Bernoulli equation.

$$\frac{dy}{dx} + y = e^{x}y^{-2}$$

Question 9

Solve the following Bernoulli equation.

$$x\frac{dy}{dx} + y = x^3y^2$$