Assignment # 1 DE

Q1. Verify that whether the indicated function y is a solution of the given first-order differential equation or not.

A. $\frac{dm}{dt} + 20m = 24$; $m = \frac{6}{5} - \frac{6}{5}e^{-20t}$

B. $y' = 25 + y^2$; $y = tanx + sinx$

Q2.A. Find values of *m* so that the function $y = e^{mx}$ is a solution of the DE

$$2y'' + 7y' - 4y = 0.$$

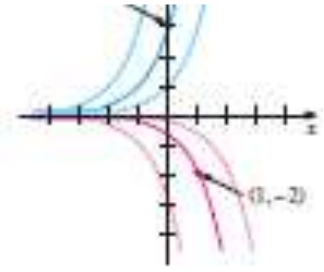
B. Find values of *m* so that the function $y = x^m$ is a solution of the DE

$$x^2y'' - 7xy' + 15y = 0.$$

Q3. $x = c_1 \cos t + c_2 \sin t$ is a two-parameter family of solutions of the second-order DE $x'' + x = 0$. Find a solution of the second-order IVP consisting of this differential equation and the given initial condition:

$$x\left(\frac{\pi}{6}\right) = \frac{1}{2} \quad ; \quad x'\left(\frac{\pi}{6}\right) = 0$$

Q4. Some of the curves corresponding to different values of C in the general solutions of differential equations are given below. Find the particular solution that passes through the point given on the plot in each case.

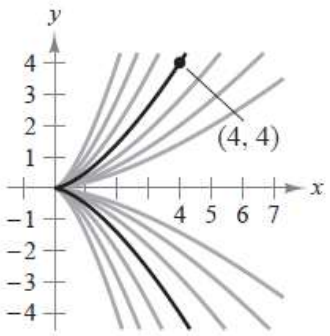


$y = Ce^x$

$y' - y = 0$

$y^2 = Cx^3$

$2xy' - 3y = 0$



Q5. Solve the following DEs or IVPs by using either separation of variables or method for linear equations.

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

$$\frac{dN}{dt} + N = Nte^{t+2}$$

$$(x+1)\frac{dy}{dx} + y = \ln x, \quad y(1) = 10$$

$$\frac{dy}{dx} = \left(\frac{2y+3}{4x+5}\right)^2$$

Due Date: Monday: April 4, 2022.