MAT 303: ASSIGNMENT 2

1. (a) $x^2y'' - 4xy' + 6y = 0$

   (b) $x^2y'' + 5xy' + 3y = \dfrac{2}{x^2+1}$

   (c) $y'' + 6y' + 25y = 32e^{-3x} - 204\sin(x)$

   (d) $y''' - y' = \dfrac{2}{e^x+1}$

2. Given that $y_1 = 1 + x$ is a solution of $xy'' - (1+x)y' + y = 0$,
   find the general solution of $xy'' - (1+x)y' + y = x^2e^{2x}$

3. (a)
$$\begin{cases} x' & = -15x - 6y - 2z \\ y' & = 32x + 14y + 2z \\ z' & = 16x + 6y + 3z \end{cases}$$

   (b)
$$\begin{cases} x' & = -15x + 2y - 6z \\ y' & = 32x - 3y + 12z \\ z' & = 48x - 6y + 19z \end{cases}$$

   (c)
$$\begin{cases} x' & = 6x - 3y + 4z \\ y' & = 5x - 4y + 2z \\ z' & = -10x + 4y - 7z \end{cases}$$

   (d)
$$\begin{cases} x' & = -3x + y - 3z \\ y' & = -3x + 2y - 2z \\ z' & = 4x - y + 4z \end{cases}$$

4. (a)
$$\begin{cases} x' & = -4x + y + 3z + 3t \\ y' & = -2y \\ z' & = -2x + y + z + 3\cos(t) \end{cases}$$

   (b)
$$\begin{cases} x' & = -\dfrac{1}{2}x + y + \dfrac{1}{2}z + 3t \\ y' & = x - y + z - \sin(t) \\ z' & = \dfrac{1}{2}x + y - \dfrac{1}{2}z \end{cases}$$