Assignment-3

Harshit Hiremath
1BM18CS036

1. Write in to fundamental form.

a) $\frac{dx(t)}{dt} = 3x(t) + 7y(t) + 2$

$\frac{dy(t)}{dt} = x(t) + y(t) + 2t \quad ; \quad x(1) = 2, \; y(1) = -3$

$$\Rightarrow \begin{bmatrix} dx(t)/dt \\ dy(t)/dt \end{bmatrix} = \begin{bmatrix} 3 & 7 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x(t) \\ y(t) \end{bmatrix} + \begin{bmatrix} 2 \\ 2t \end{bmatrix}$$

$$\text{and} \quad \begin{bmatrix} x(1) \\ y(1) \end{bmatrix} = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$$A = \begin{bmatrix} 3 & 7 \\ 1 & 1 \end{bmatrix} \qquad f(t) = \begin{bmatrix} 2 \\ 2t \end{bmatrix} \qquad c = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$$

$$t_0 = 1$$

initial value problem

~~$\frac{dx(t)}{dt} = Ax(t) + f(t) \; ; \; x(t_0) = c$~~

~~where $x(t) = \begin{bmatrix} x(t) \\ y(t) \end{bmatrix}$~~

$$\frac{dx(t)}{dt} = Ax(t) + f(t) \qquad \& \; x(t_0) = c$$