Critical Point

Let Us Consider the dynamical system

$$\boxed{\begin{aligned}\dot{\boldsymbol{x}} &= \boldsymbol{f_1}(\boldsymbol{x}, \boldsymbol{y}) \\ \dot{\boldsymbol{y}} &= \boldsymbol{f_2}(\boldsymbol{x}, \boldsymbol{y})\end{aligned}} \text{--------------(i)}$$

A point (x_c, y_c) is called critical point of the system (i) if $\frac{dy}{dt} = 0$ & $\frac{dy}{dt} = 0$ at that point .

The System (i) can be written as $\begin{bmatrix}\dot{x} \\ \dot{y}\end{bmatrix} = \begin{bmatrix}f_1(x, y) \\ f_2(x, y)\end{bmatrix}$

$$\dot{X} = f(x) ---------(ii)$$

Where X $= \begin{bmatrix}\dot{x} \\ \dot{y}\end{bmatrix}$ & X $= \begin{bmatrix}f_1 \\ f_2\end{bmatrix}$

Hence a point x_c is called critical point of the system (ii) if $\dot{x} = 0 \; at \; x = x_c$

Nature of the critical point:

Let Us Consider the dynamical system

$$\boxed{\begin{aligned}\dot{\boldsymbol{x}} &= \boldsymbol{f_1(x, y)}\\ \dot{\boldsymbol{y}} &= \boldsymbol{f_2(x, y)}\end{aligned}} \text{--------------(i)}$$

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Where $\mathrm{X} = \begin{bmatrix}\dot{x}\\ \dot{y}\end{bmatrix}$ & $\mathrm{X} = \begin{bmatrix}f_1\\ f_2\end{bmatrix}$

Hence a point x_c is called critical point of the system (ii) if $\dot{x} = 0\ at\ x = x_c$