

10.3.11

EE25BTECH11012-BEERAM MADHURI

Question:

Find the normal at the point $(1, 1)$ on the curve

$$2y + x^2 = 3 \quad (0.1)$$

Solution:

$$2y + x^2 = 3 \quad (0.2)$$

$$2y + x^2 - 3 = 0 \quad (0.3)$$

Which can be expressed as the conic:

$$\mathbf{x}^\top \mathbf{V} \mathbf{x} + 2\mathbf{u}^\top \mathbf{x} + f = 0 \quad (0.4)$$

$$\mathbf{V} = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}, \mathbf{u} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}, f = -3 \quad (0.5)$$

let

$$\mathbf{p} \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \mathbf{m} \text{ is normal vector} \quad (0.6)$$

$$\mathbf{m}^\top (\mathbf{V} \mathbf{p} + \mathbf{u}) = 0 \quad (0.7)$$

then

$$\mathbf{m} = \begin{pmatrix} -k \\ k \end{pmatrix} \quad (0.8)$$

equation of normal is

$$\mathbf{m}^\top (\mathbf{x} - \mathbf{p}) = 0 \quad (0.9)$$

$$\begin{pmatrix} -1 & 1 \end{pmatrix} \begin{pmatrix} x-1 \\ y-1 \end{pmatrix} = 0 \quad (0.10)$$

$$y = x \quad (0.11)$$

Hence equation of normal to $2y + x^2 - 3 = 0$ at $(1, 1)$ is $y = x$.

Graphs of Normal to the Curve

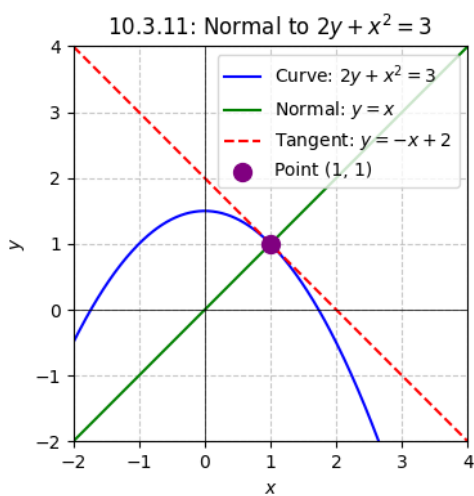


Fig. 0.1: 10.3.11