

# conic Assignment

Harsha sai sampath kumar

September 2022

**Problem Statement** -Angle between the tangents to the curve  $y = x^2 - 5x + 6$  at the point (2,0) and (3,0) is

**Solution**

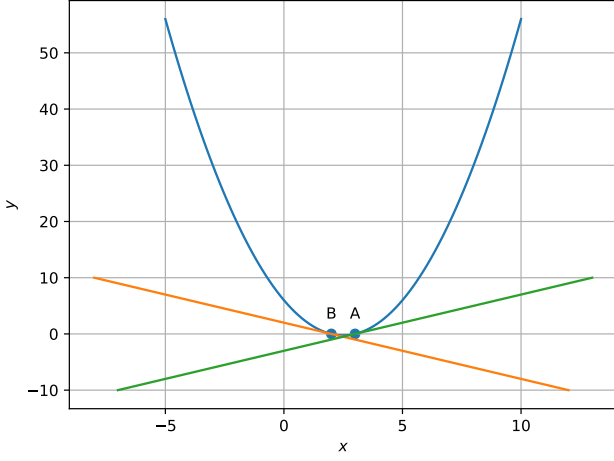


Figure 1:

## 1 Construction

Point	Value	Description
B	(2,0)	Given point
A	(3,0)	Given point

Given equation is

$$y = x^2 - 5x + 6 = 0$$

$$x^2 - 5x - y + 6 = 0$$

$$\mathbf{x}^T \mathbf{V} \mathbf{x} + 2\mathbf{U}^T \mathbf{x} + f = 0$$

$$V = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \quad u = \begin{pmatrix} -5/2 \\ -1/2 \end{pmatrix} \quad f = 6$$

Where

$$(\mathbf{V}\mathbf{q} + \mathbf{u})^T \mathbf{x} + \mathbf{u}^T \mathbf{q} + f = 0$$

From the point 1

$$\mathbf{Q}_1 = \begin{pmatrix} 2 \\ 0 \end{pmatrix} \quad (6)$$

By substituting the point Q in the above equation

$$(\mathbf{V}\mathbf{q} + \mathbf{u})^T \mathbf{x} + \mathbf{u}^T \mathbf{q} + f = 0 \quad (7)$$

$$(-1/2 \quad -1/2)x + (-5/2 \quad -1/2) \begin{pmatrix} 2 \\ 0 \end{pmatrix} + 6 = 0 \quad (8)$$

From above equation

$$\mathbf{m}_1 = (-1/2 \quad -1/2) \quad (9)$$

From the point 2

$$\mathbf{Q}_2 = \begin{pmatrix} 3 \\ 0 \end{pmatrix} \quad (10)$$

$$(1/2 \quad -1/2)x + (-5/2 \quad -1/2) \begin{pmatrix} 3 \\ 0 \end{pmatrix} + 6 = 0 \quad (11)$$

From above equation

$$\mathbf{m}_2 = (1/2 \quad -1/2) \quad (12)$$

The angle between two vectors is given by

$$\theta = \cos^{-1} \frac{\mathbf{m}_1^T \mathbf{m}_2}{\|\mathbf{m}_1\| \|\mathbf{m}_2\|} \quad (13)$$

(1) By substituting values of  $\mathbf{m}_1$  and  $\mathbf{m}_2$  in the following Equation

$$\cos^{-1} \theta = 0 \quad (14)$$

Angle between them is  $\frac{\pi}{2}$