10.10.2.4

Question : Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Solution :

Input parameters	Description	Value
$\mathbf{O}$	Center	$\mathbf{0}$
r	Radius	1
θ_1	Angle	53.6°
θ_2	Angle	126.4°

Table 1: Table of input parameters

Input parameters	Description	Value
$\mathbf{u}$	-	$-\mathbf{O}$
$\mathbf{A}$	Point	$\begin{pmatrix}\cos\theta_1\\ \sin\theta_1\end{pmatrix}$
$\mathbf{B}$	Point	$\begin{pmatrix}\cos\theta_2\\ \sin\theta_2\end{pmatrix}$
$\mathbf{m_1}$	Direction vector of one tangent	$\begin{pmatrix}-\cos\theta_1\\ -\sin\theta_1\end{pmatrix}$
$\mathbf{m_2}$	Direction vector of another tangent	$\begin{pmatrix}-\cos\theta_2\\ -\sin\theta_2\end{pmatrix}$

Table 2: Table of output parameters

Angle between these two tangents is

$$\cos\theta = \frac{\mathbf{m_1}^\top \mathbf{m_2}}{||\mathbf{m_1}||||\mathbf{m_2}||} \tag{1}$$

$$or, \theta = \pi \tag{2}$$

Therefore,the two tangents are parallel to each other.

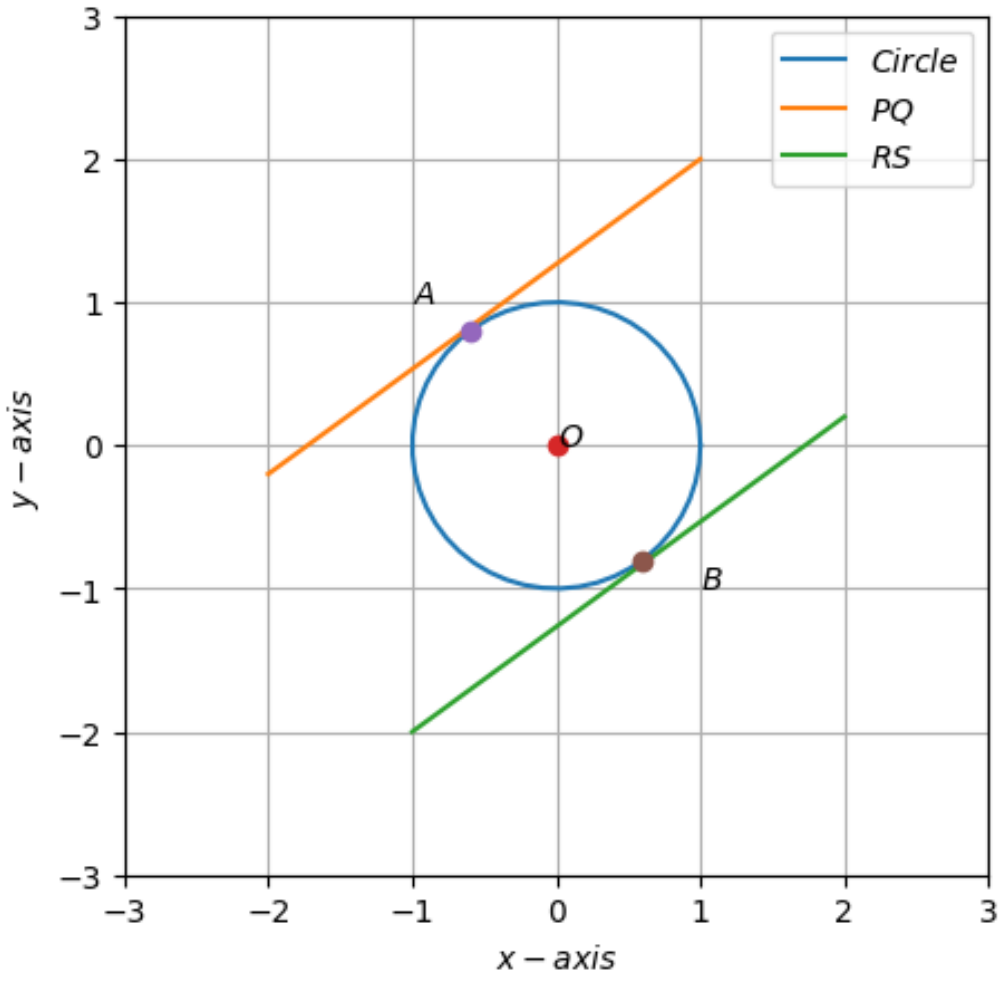

Figure 1: