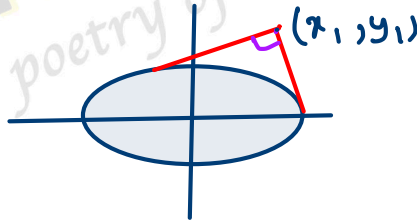


Plane Geometry

Ellipse

Find the equation of director
circle of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$



Sol.

Given ellipse is

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \quad \text{--- (i)}$$

eq. of tangent to (i) is

$$y = mx + \sqrt{a^2m^2 + b^2}$$

$$y - mx = \sqrt{a^2m^2 + b^2}$$

sq. both side

$$(y - mx)^2 = a^2m^2 + b^2 \quad \text{--- (ii)}$$



OMG! MATHS }
The poetry of logical ideas.

② Passes through (x_1, y_1)

$$(y_1 - mx_1)^2 = a^2 m^2 + b^2$$

$$y_1^2 + m^2 x_1^2 - 2y_1 m x_1 = a^2 m^2 + b^2$$

$$y_1^2 + m^2 x_1^2 - 2y_1 m x_1 - a^2 m^2 - b^2 = 0$$

$$(x_1^2 - a^2) m^2 - 2m x_1 y_1 + y_1^2 - b^2 = 0$$

which is quadratic in m .

Let m_1 & m_2 are two roots.

because for director circle
tangents are \perp

$$m_1 m_2 = -1$$
$$\frac{y_1^2 - b^2}{x_1^2 - a^2} = -1$$

$$y_1^2 - b^2 = -x_1^2 + a^2$$

$$y_1^2 + x_1^2 = a^2 + b^2$$

Change (x_1, y_1) to (x, y)

$$x^2 + y^2 = a^2 + b^2$$