

#26a) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. $\frac{dy}{dx} = ?$

$$\frac{d}{dx} \left(\frac{x^2}{a^2} + \frac{y^2}{b^2} \right) = 0$$

$$\frac{2x}{a^2} + \frac{2y}{b^2} \cdot \frac{dy}{dx} = 0$$

$$\frac{2y}{b^2} \cdot \frac{dy}{dx} = -\frac{2x}{a^2}$$

$$\frac{dy}{dx} = \frac{-\frac{2x}{a^2}}{\frac{2y}{b^2}} = -\frac{x}{a^2} \cdot \frac{b^2}{y} = -\frac{b^2 x}{a^2 y}$$

Oct 14-11:59 AM

$$\frac{dy}{dx} = -\frac{b^2 x}{a^2 y}$$

At (x_0, y_0) ; $\frac{dy}{dx} = \frac{-b^2 x_0}{a^2 y_0}$ ← slope of the tangent line at (x_0, y_0)

Point-Slope formula:

$$y - y_0 = \left(\frac{-b^2 x_0}{a^2 y_0} \right) (x - x_0)$$

$$y - y_0 = \frac{-b^2 x_0 x}{a^2 y_0} + \frac{b^2 x_0^2}{a^2 y_0}$$

? $\rightarrow \frac{x x_0}{a^2} + \frac{y y_0}{b^2} = 1$

Oct 14-12:12 PM

$$\frac{y_0}{b^2} (y - y_0) = \left(\frac{-b^2 x_0 x}{a^2 y_0} + \frac{b^2 x_0^2}{a^2 y_0} \right) \frac{y_0}{b^2}$$

$$\frac{y y_0}{b^2} - \frac{y_0^2}{b^2} = -\frac{x x_0}{a^2} + \frac{x_0^2}{a^2}$$

$$\frac{y y_0}{b^2} + \frac{x x_0}{a^2} = \frac{x_0^2}{a^2} + \frac{y_0^2}{b^2}$$

$$\frac{x x_0}{a^2} + \frac{y y_0}{b^2} = 1$$

Oct 14-12:16 PM

$$\sqrt{x} + \sqrt{y} = \sqrt{c} \quad \text{Find } \frac{dy}{dx}$$

$$\frac{d}{dx} (\sqrt{x} + \sqrt{y}) = \frac{d}{dx} (\sqrt{c})$$

$$\frac{1}{2\sqrt{x}} + \frac{1}{2\sqrt{y}} \cdot \frac{dy}{dx} = 0$$

$$\frac{1}{2\sqrt{y}} \cdot \frac{dy}{dx} = -\frac{1}{2\sqrt{x}}$$

$$\frac{dy}{dx} = \frac{-2\sqrt{y}}{2\sqrt{x}} = -\frac{\sqrt{y}}{\sqrt{x}}$$

$$y = mx + b$$

y-intercept $\bullet (0, \frac{b}{m})$
x-intercept $\bullet (\frac{-b}{m}, 0)$

Oct 14-12:25 PM

(a, b) $\sqrt{a} + \sqrt{b} = \sqrt{c}$

Slope of tangent line at $(a, b) \bullet \frac{-\sqrt{b}}{\sqrt{a}}$

Equation of tangent line at (a, b)

$$y - b = \left(\frac{-\sqrt{b}}{\sqrt{a}} \right) (x - a)$$

$$y = \frac{-\sqrt{b}}{\sqrt{a}} x + \frac{\sqrt{b}}{\sqrt{a}} a + b$$

$$y = \frac{-\sqrt{b}}{\sqrt{a}} x + (\sqrt{b} \cdot \sqrt{a} + b)$$

y-intercept $\sqrt{ab} + b$; x-intercept: $\frac{\sqrt{ab} + b}{\frac{\sqrt{b}}{\sqrt{a}}}$

Oct 14-12:26 PM

$$\sqrt{ab} + b + \frac{\sqrt{ab} + b}{\frac{\sqrt{b}}{\sqrt{a}}}$$

$$= \sqrt{ab} + b + \frac{(\sqrt{ab} + b) \sqrt{a}}{\sqrt{b}}$$

$$= \sqrt{ab} + b + \frac{a\sqrt{b} + b\sqrt{a}}{\sqrt{b}}$$

$$= \sqrt{ab} + b + a + \sqrt{ab}$$

$$= \boxed{a + 2\sqrt{ab} + b} = (\sqrt{a})^2 + 2\sqrt{a}\sqrt{b} + (\sqrt{b})^2$$

$$= (\sqrt{a} + \sqrt{b})^2 = (\sqrt{c})^2 = \boxed{c}$$

Oct 14-12:34 PM