$x^2 + xy + y^2 = 27$

A) Write an expression for the slope of the curve at any point (x,y)

Slope : $2x + x\,y' + y + 2y\,y' = 0$

$y'(x + 2y) = -(2x + y)$

$$y' = -\frac{(2x + y)}{x + 2y}$$

B.) Determine whether the lines tangent to the curve at the x-intercepts of the curve are parallel.

Find x-intercepts : $y = 0$

When $y = 0$ $\quad x = \pm 3\sqrt{3}$

$$y' = \frac{-2x}{x} = -2$$

The tangent lines at the x-intercepts are parallel.

C.) Find the points on the curve where the tangent lines are vertical.

$y' = -\frac{(2x + y)}{x + 2y}$ is not defined when $x + 2y = 0$

or $y = \frac{-x}{2}$

Then $x^2 + x\left(\frac{-x}{2}\right) + \left(\frac{-x}{2}\right)^2 = 27$

$x^2 = 36$

$x = \pm 6$ $\quad y = \mp 3$

The curve has vertical tangent lines at (6, -3) and (-6, 3)

Oct 14-7:28 AM