Calculus   Worksheet #4   Unit 5   Selected Solutions

Use implicit differentiation to find dy/dx for each of the following equations.

3. $4x^2 + 9y^2 = 36$

     $8x + (18y)dy/dx = 0$

     $(18y)dy/dx = -8x$

     $dy/dx = \dfrac{-4x}{9y}$

Find the equation of the line that is tangent to the graph of the given equation at the given point.

10. $xy = 12$; (-3, -4)

     $(x)dy/dx + y(1) = 0$

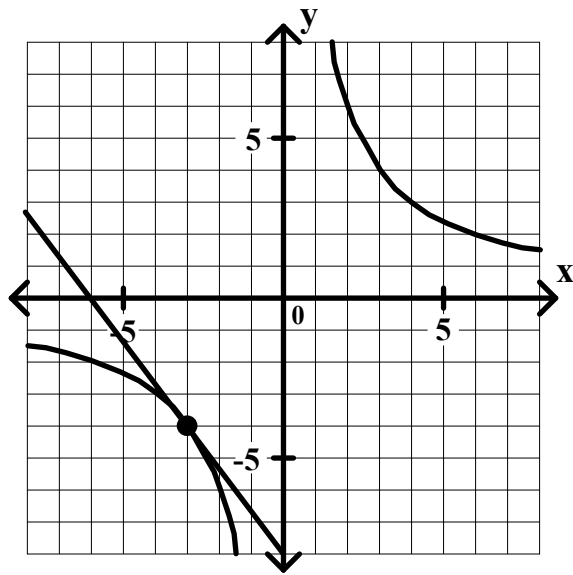 $(x)dy/dx = -y$

     $dy/dx = \dfrac{-y}{x}$

At (-3, -4) the slope of the tangent line is -4/3.

The equation of the tangent line is …

     $y + 4 = (-4/3)(x + 3)$
     $y + 4 = (-4/3)x - 4$
     $y = (-4/3)x - 8$

7. $y^2 + 3xy - 4x^2 = 10$

     $(2y)dy/dx + (3x)dy/dx + y(3) - 8x = 0$

     $(2y + 3x)dy/dx = 8x - 3y$

     $dy/dx = \dfrac{8x - 3y}{3x + 2y}$

Find the equation of the line that is normal to the graph of the given equation at the given point.

16. $x^2 + y^2 - 4x + 2y - 20 = 0$; (-1, 3)

     $2x + (2y)dy/dx - 4 + (2)dy/dx = 0$

     $(2y + 2)dy/dx = -2x + 4$

     $dy/dx = \dfrac{-x + 2}{y + 1}$

At (-1, 3) the slope of the tangent line is 3/4.
The slope of the normal line is -4/3.

The equation of the normal line is …

     $y - 3 = (-4/3)(x + 1)$
     $y - 3 = (-4/3)x - 4/3$
     $y = (-4/3)x + 5/3$