Bagaasen

Super Secret Number Puzzle

Implicit Differentiation

Place your answer to each problem on the corresponding answer line on the left of the problems. When finished, add up all of your answers & see if your total matches the super secret number!

1. -2 Find the derivative of $x^2 + y^2 = 1$ at the point (2 , 1).

$2x + 2yy' = 0$ $\quad y' = \frac{-x}{y} = \frac{-2}{1}$

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

2. -5/2 Find the derivative of $x^3y^2 + 2x = 1$ at the point (1 , 1).

$x^3(2yy') + 3x^2y^2 + 2 = 0$ $\quad y' = \frac{-3x^2y^2 - 2}{x^3(2y)}$

$x^3(2yy') = -3x^2y^2 - 2$ $\quad -3 - 2 = -5$

3. 0 Find the derivative of $y^3 + y^2 - 5y - x^2 = -4$ at the point (0 , 2).

$3y^2y' + 2yy' - 5y' - 2x = 0$

$y'(3y^2 + 2y - 5) = 2x$

$y' = \frac{2x}{3y^2 + 2y - 5}$

4. 14/5 What is the y-intercept for the equation of the tangent line to the curve $x^2 - xy + y^2 = 7$ at (-1 , 2).

$2x - [xy' + y] + 2yy' = 0$

$2x - xy' - y + 2yy' = 0$

$-xy' + 2yy' = -2x + y$

$y' = \frac{-2x + y}{-x + 2y}$ $\quad \frac{2+2}{1+4} = \frac{4}{5}$

$y - 2 = \frac{4}{5}(x + 1)$ $\quad y = \frac{4}{5}x + \frac{4}{5} + 2$

5. 0 Find the second derivative of $siny = x$ when y is π.

$\cos(y)y' = 1$

$y' = \frac{1}{\cos(y)} = (\cos(y))^{-1}$

Super Secret # -1.7

$y'' = -(\cos(y))^{-2} \cdot -\sin(y)y'$

$y'' = y'(\cos(y))^{-2}\sin(y)$

$y'' = (\cos(y))^{-1}(\cos(y))^{-2}\sin y$

$= \frac{\sin(y)}{\cos^3(y)} = \frac{\sin(\pi)}{\cos^3(\pi)} = \frac{0}{-1}$