

Implicit differentiation--Second derivatives

Date _____

For each problem, use implicit differentiation to find $\frac{d^2y}{dx^2}$ in terms of x and y .

1) $x^3 = 2y^2 + 5$

2) $5x + 3y^2 = 1$

3) $5x^2 = 5y^2 + 4$

4) $x^3 + 4y^2 = 1$

5) $3x^2 + y^2 = 2$

6) $5 = 4x^3 - 4y^2$

7) $2 = 2x^2 - 4y^2$

8) $x^2 + 4y^2 = 5$

9) $2x - 5y^2 = 3$

10) $5x^3 = -4y^2 + 4$

11) $4x^2 = 5y^2 + 2$

12) $3x^2 = -3y^2 + 3$

$$13) 5x^3 = 4y^2 + 4$$

$$14) 2x + y^2 = 5$$

$$15) -2y^2 + 2 = 3x$$

$$16) 5 = 4x - 5y^2$$

$$17) 5 = x^2 - 2y^2$$

$$18) -4y^2 + 4 = 4x^2$$

$$19) 5 = 2x - 5y^2$$

$$20) 5y^2 + 2 = 5x^2$$

Answers to Implicit differentiation--Second derivatives

$$\begin{array}{llll}
 1) \frac{d^2y}{dx^2} = \frac{24xy^2 - 9x^4}{16y^3} & 2) \frac{d^2y}{dx^2} = -\frac{25}{36y^3} & 3) \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3} & 4) \frac{d^2y}{dx^2} = \frac{-48xy^2 - 9x^4}{64y^3} \\
 5) \frac{d^2y}{dx^2} = \frac{-3y^2 - 9x^2}{y^3} & 6) \frac{d^2y}{dx^2} = \frac{12xy^2 - 9x^4}{4y^3} & 7) \frac{d^2y}{dx^2} = \frac{2y^2 - x^2}{4y^3} & 8) \frac{d^2y}{dx^2} = \frac{-4y^2 - x^2}{16y^3} \\
 9) \frac{d^2y}{dx^2} = -\frac{1}{25y^3} & 10) \frac{d^2y}{dx^2} = \frac{-240xy^2 - 225x^4}{64y^3} & 11) \frac{d^2y}{dx^2} = \frac{20y^2 - 16x^2}{25y^3} & \\
 12) \frac{d^2y}{dx^2} = \frac{-y^2 - x^2}{y^3} & 13) \frac{d^2y}{dx^2} = \frac{240xy^2 - 225x^4}{64y^3} & 14) \frac{d^2y}{dx^2} = -\frac{1}{y^3} & \\
 15) \frac{d^2y}{dx^2} = -\frac{9}{16y^3} & 16) \frac{d^2y}{dx^2} = -\frac{4}{25y^3} & 17) \frac{d^2y}{dx^2} = \frac{2y^2 - x^2}{4y^3} & 18) \frac{d^2y}{dx^2} = \frac{-y^2 - x^2}{y^3} \\
 19) \frac{d^2y}{dx^2} = -\frac{1}{25y^3} & 20) \frac{d^2y}{dx^2} = \frac{y^2 - x^2}{y^3} & &
 \end{array}$$