Calculus

Implicit Differentiation Practice

For each problem, use implicit differentiation to find $\dfrac{dy}{dx}$ in terms of x and y.

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

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

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

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

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

6) $2xy = 4x^3 + 4y^2$

7) $4xy^2 + 2 = 5x^3$

8) $x^2 = 4xy^2 + 1$

9) $4x^3 = 5x^2y^2 + 4xy^3$

10) $3x^2 - xy^2 = 3x^3y$

For each problem, use implicit differentiation to find $\dfrac{dy}{dx}$ at the given point.

11) $4x^2 = -2xy + 2$ at $(1, -1)$

12) $-y^2 + 4y = 5x^3$ at $(-1, 5)$

13) $x^2y + 2 = 2x$ at $(-1, -4)$

14) $xy = x - 3y$ at $(-2, -2)$

15) $3 = 2x - x^3y$ at $(-1, 5)$

16) $-3y^3 + 2y^2 = 5x^3$ at $(1, -1)$

Answers to Implicit Differentiation Practice

1) $\dfrac{dy}{dx} = \dfrac{2}{9y^2}$

2) $\dfrac{dy}{dx} = \dfrac{5x}{6y^2}$

3) $\dfrac{dy}{dx} = \dfrac{4}{8y+3}$

4) $\dfrac{dy}{dx} = \dfrac{1}{5y+2}$

5) $\dfrac{dy}{dx} = \dfrac{-6x+9x^2y^3}{-9y^2x^3-8y}$

6) $\dfrac{dy}{dx} = \dfrac{6x^2-y}{x-4y}$

7) $\dfrac{dy}{dx} = \dfrac{15x^2-4y^2}{8xy}$

8) $\dfrac{dy}{dx} = \dfrac{-2y^2+x}{4xy}$

9) $\dfrac{dy}{dx} = \dfrac{-5xy^2-2y^3+6x^2}{5x^2y+6xy^2}$

10) $\dfrac{dy}{dx} = \dfrac{9x^2y-6x+y^2}{-2xy-3x^3}$

11) $\left. \dfrac{dy}{dx} \right|_{\substack{x=1 \\ y=-1}} = -3$

12) $\left. \dfrac{dy}{dx} \right|_{\substack{x=-1 \\ y=5}} = -\dfrac{5}{2}$

13) $\left. \dfrac{dy}{dx} \right|_{\substack{x=-1 \\ y=-4}} = -6$

14) $\left. \dfrac{dy}{dx} \right|_{\substack{x=-2 \\ y=-2}} = 3$

15) $\left. \dfrac{dy}{dx} \right|_{\substack{x=-1 \\ y=5}} = 13$

16) $\left. \dfrac{dy}{dx} \right|_{\substack{x=1 \\ y=-1}} = -\dfrac{15}{13}$