

Differentiate each.

1. $x^3 + y^3 = 6xy$

2. $x^3 + x^2y + 4y^2 = 6$

3. $x^2y + xy^2 = 3x$

4. $4 \cos x \sin y = 1$

5. $x \cos y + y \cos x = 1$

6. $y = \cos(xy)$

7. Find $\frac{d^2y}{dx^2}$ for $x^2 + y^2 = 25$

8. Find an equation of the tangent line to the curve $y^2 = x^3(2-x)$ at the point $(1,1)$.

9. Find all point on the curve $x^2y^2 + xy = 2$ where the slope of the tangent line is -1 .

10. Find the equation of the tangent line to the ellipse $x^2 + 4y^2 = 36$ that pass through the point $(12,3)$.

Review

11. $\lim_{x \rightarrow 2} \frac{2x^2 - 3x - 2}{x^2 + 3x - 10}$

12. $\lim_{x \rightarrow \infty} \frac{3x^2 - 5}{x - 3}$

13. $g(x) = \log_3(x^2)$ find $g'(x)$

14. $h(x) = \sqrt{\frac{2x-4}{3x+5}}$ find $h'(x)$

15. $\frac{d}{dx} [f(x^2)]_{x=2}$

x	2	4
f(x)	-3	5
f'(x)	3	-7

16. $\frac{d}{dx} [(f(x))^2]_{x=2}$

x	2	4
f(x)	-3	5
f'(x)	3	-7

Answers:

1) $\frac{dy}{dx} = \frac{2y - x^2}{y^2 - 2x}$

2) $\frac{dy}{dx} = \frac{-3x^2 - 2xy}{x^2 + 8y}$

3) $\frac{dy}{dx} = \frac{3 - 2xy - y^2}{x^2 + 2xy}$

4) $\frac{dy}{dx} = \frac{\sin x \sin y}{\cos x \cos y} = \tan x \tan y$

5) $\frac{dy}{dx} = \frac{y \sin x - \cos y}{\cos x - x \sin y}$

6) $\frac{dy}{dx} = \frac{-y \sin(xy)}{1 + x \sin(xy)}$

7) $\frac{d^2y}{dx^2} = \frac{-25}{y^3}$

8) $y - 1 = 1(x - 1)$

9) (1,1), (1,-2),
(-1,-1), & (-1,2)

10) $y - 3 = -1(x - 12)$

11) $\frac{5}{7}$

12) ∞

13) $\frac{1}{x \ln 3}$

14) $\frac{11}{(2x - 4)^{\frac{1}{2}} (3x + 5)^{\frac{3}{2}}}$

15) -28

16) -18