IMPLICIT DIFFERENTIATION

You may not use your calculator.

For each of the following find $\dfrac{dy}{dx}$.

1. $2x^3 - x^2y + y^3 - 1 = 0$
2. $3y^4 + 4x - x^2 \sin y = 4$
3. $2x - \sqrt{xy} + y^3 = 16$
4. $x^2 + \sqrt{xy} = 7$
5. $\sin^2 3y = x + y - 1$
6. $xy = \tan y$
7. $5x^2 + 2x^2y + y^2 = 8$
8. $\sec^2 x + \csc^2 y = 4$
9. $x \sin y + y \cos x = 1$
10. $2x^3y + 3xy^3 = 5$
11. $x = \sin(x + y)$
12. $\cos(x + y) = y \sin x$
13. $\sin xy = x^3 + y^3$
14. $x^2 + y^2 = 7xy$
15. $\dfrac{3}{x} - \dfrac{3}{y} = 2x$
16. $\sqrt{x} + \sqrt{y} = 4$

Find the second derivative.

17. $\dfrac{dy}{dx} = y(x - 3)$
18. $\dfrac{dW}{dt} = W^2 - 5$

IMPLICIT DIFFERENTIATION–ANSWERS

1. $\dfrac{dy}{dx} = \dfrac{6x^2 - 2xy}{x^2 - 3y^2}$
2. $\dfrac{dy}{dx} = \dfrac{4 - 2x \sin y}{x^2 \cos y - 12y^3}$
3. $\dfrac{dy}{dx} = -\dfrac{y - 4\sqrt{xy}}{x - 6y^2\sqrt{xy}}$
4. $\dfrac{dy}{dx} = -\dfrac{4x\sqrt{xy} - y}{x}$
5. $\dfrac{dy}{dx} = \dfrac{1}{6 \sin 3y \cos 3y - 1}$
6. $\dfrac{dy}{dx} = -\dfrac{y}{x - \sec^2 y}$
7. $\dfrac{dy}{dx} = -\dfrac{2xy + 5x}{x^2 + y}$
8. $\dfrac{dy}{dx} = \dfrac{\sec^2 x \tan x}{\csc^2 y \cot y}$
9. $\dfrac{dy}{dx} = \dfrac{y \sin x - \sin y}{x \cos y + \cos x}$
10. $\dfrac{dy}{dx} = -\dfrac{6x^2y + 3y^2}{2x^3 + 9xy^2}$
11. $\dfrac{dy}{dx} = \dfrac{1 - \cos(x + y)}{\cos(x + y)}$
12. $\dfrac{dy}{dx} = -\dfrac{\sin(x + y) + y \cos x}{\sin(x + y) + \sin x}$
13. $\dfrac{dy}{dx} = \dfrac{3x^2 - y \cos xy}{x \cos xy - 3y^2}$
14. $\dfrac{dy}{dx} = \dfrac{7y - 2x}{2y - 7x}$
15. $\dfrac{dy}{dx} = \dfrac{2x^2y^2 + 3y^2}{3x^2}$
16. $\dfrac{dy}{dx} = -\dfrac{\sqrt{y}}{\sqrt{x}}$
17. $\dfrac{d^2y}{dx^2} = y + y(x - 3)^2$
18. $\dfrac{d^2W}{dt^2} = 2W(W^2 - 5)$