MCS 121 Implicit Differentiation

Assume that y is a function of x. Find $y' = \frac{dy}{dx}$ in each case.

1. $x^5 + y^5 = 32$.

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

3. $\dfrac{y}{x} + \sqrt{y} = 1$

4. $\ln(xy) + \ln y^5 = 4$

5. $\sin(x + y) + xy = 5$

6. $\sec(x + y) + xy = 6$

7. $\csc(xy) + x + y = 7$

8. $e^{\cos(y)} = x^3 \arctan y$

9. $\sin^2 y + \cos^2 y = x \arcsin y$

10. $\ln(x^2y^3) = \cot(x - y)$

ANSWERS

1. $y' = -\dfrac{x^4}{y^4}$.

2. $y' = \dfrac{2xy^3 + 1}{1 - 3x^2y^2}$.

3. $y' = \dfrac{2y^{3/2}}{2xy^{1/2} + x^2}$.

4. $y' = -\dfrac{y}{6x}$.

5. $y' = -\dfrac{\cos(x+y) + y}{\cos(x+y) + x}$.

6. $y' = -\dfrac{\sec(x+y)\tan(x+y) + y}{\sec(x+y)\tan(x+y) + x}$.

7. $y- = \dfrac{y\csc(xy)\cot(xy) - 1}{-x\csc(xy)\cot(xy) + 1}$.

8. $y' = -\dfrac{3x^2(1+y^2)\arctan(y)}{(1+y^2)\sin(y)e^{\cos(y)} + x^3}$.

9. $y' = -\dfrac{\sqrt{1-y^2}\arcsin(y)}{x}$.

10. $y' = \dfrac{-xy\csc^2(x-y) - 2y}{3x - xy\csc^2(x-y)}$.