

Section 3.8 Implicit Differentiation

1. Find the derivative by using implicit differentiation.

a. $xy + y^2 = 1$

b. $y + \sqrt{xy} = 6$

c. $y\sqrt{x^2 + y^2} = 15$

d. $\sin(x) \cdot \cos(y - 1) = \frac{1}{2}$

Section 3.9 Derivatives of Log and Exponential Functions

2. Find the derivatives

a. $\frac{d}{dx}(\ln(2x^8))$

b. $\frac{d}{dx}\left(\frac{\ln(x^2)}{x}\right)$

c. $\frac{d}{dx}\left(\ln\left(\frac{x+1}{x-1}\right)\right)$

d. $\frac{d}{dx}\left(\frac{\ln(x)}{\ln(x)+1}\right)$

e. $\frac{d}{dx}(\ln(e^x + e^{-x}))$

Math 251 Week 6 Activity B –Section 3.8 Implicit Differentiation, Section 3.9 Derivatives of Log and Exponential Functions

f. $\frac{d}{dx}((\ln(2x^2 + 5)))$

g. $\frac{d}{dx}(x^{\cos(x)})$

h. $\frac{d}{dx}[(\sin 8x) \cdot \ln(\sin^2(8x))]$

i. $\frac{d}{dx}\left(1 + \frac{4}{x}\right)^x$

Math 251 Week 6 Activity B –Section 3.8 Implicit Differentiation, Section 3.9 Derivatives of Log and Exponential Functions

3. Find the derivatives

a. $y = 5^{3t}$

b. $y = \frac{40}{1+2^{-t}}$

c. $y = 250(1.045)^{4t}$

d. $y = x^3 \cdot 3^x$

Math 251 Week 6 Activity B –Section 3.8 Implicit Differentiation, Section 3.9 Derivatives of Log and Exponential Functions

4. For each of the following functions, $f(x)$:

(i) sketch the graph;

(ii) give the domain and range of $f(x)$;

(iii) determine the equation for the tangent line when $x = \frac{1}{2}$

(iv) sketch the tangent line on your graph of $f(x)$.

a. $f(x) = 3^x$

b. $g(x) = \log_3(x)$

c. $h(x) = 10^{\sqrt{1-x^2}}$

Math 251 Week 6 Activity B –Section 3.8 Implicit Differentiation, Section 3.9 Derivatives of Log and Exponential Functions

5. For each of the following functions, $f(x)$:

(i) sketch the graph;

(ii) give the domain and range of $f(x)$;

(iii) determine the equation for the tangent line when $x = \frac{1}{2}$

(iv) sketch the tangent line on your graph of $f(x)$.

a. $g(x) = \left(\frac{1}{2}\right)^x$

b. $g(x) = \log_{\frac{1}{2}}(x)$