

## Calculus Worksheet #4 Unit 6 Selected Solutions

Find  $f'(x)$  for each of the following functions.

$$\begin{aligned} 2. \quad f(x) &= x^2 \cos(x) \\ f'(x) &= [x^2] [-\sin(x)] + [\cos(x)] [2x] \\ f'(x) &= -x^2 \sin(x) + 2x \cos(x) \end{aligned}$$

$$\begin{aligned} 5. \quad f(x) &= \frac{\tan(x)}{2x} \\ f'(x) &= \frac{[2x][\sec^2(x)] - [\tan(x)][2]}{(2x)^2} \\ f'(x) &= \frac{2x \sec^2(x) - 2 \tan(x)}{4x^2} \end{aligned}$$

Find  $f'(x)$  and  $f''(x)$  for each of the following functions.

$$\begin{aligned} 10. \quad f(x) &= \cos(1 - x^3) \\ f'(x) &= [-\sin(1 - x^3)] [-3x^2] \\ f'(x) &= 3x^2 \sin(1 - x^3) \\ f''(x) &= [3x^2] [-3x^2 \cos(1 - x^3)] + [\sin(1 - x^3)] [6x] \\ f''(x) &= -9x^4 \cos(1 - x^3) + 6x \sin(1 - x^3) \end{aligned}$$

$$\begin{aligned} 11. \quad f(x) &= \tan(5x - 1) \\ f'(x) &= [\sec^2(5x - 1)] [5] \\ f'(x) &= 5 \sec^2(5x - 1) \end{aligned}$$

$$\begin{aligned} f''(x) &= 10 \sec^1(5x - 1) [\sec(5x - 1) \tan(5x - 1)] (5) \\ f''(x) &= 50 \sec^2(5x - 1) \tan(5x - 1) \end{aligned}$$

Find  $dy/dx$  for each of the following. (Use implicit differentiation.)

$$\begin{aligned} 15. \quad \sin(xy) &= x^2 \\ [\cos(xy)] [(x)(dy/dx) + (y)(1)] &= 2x \\ x(dy/dx) + y &= 2x \sec(xy) \\ x(dy/dx) &= 2x \sec(xy) - y \\ dy/dx &= \frac{2x \sec(xy) - y}{x} \end{aligned}$$

$$\begin{aligned} 18. \quad x \sin(y) &= y \sin(x) + 1 \\ (x)[\cos(y)](dy/dx) + [\sin(y)](1) &= (y)[\cos(x)] + [\sin(x)](dy/dx) \\ [x \cos(y) - \sin(x)](dy/dx) &= y \cos(x) - \sin(y) \\ dy/dx &= \frac{y \cos(x) - \sin(y)}{x \cos(y) - \sin(x)} \end{aligned}$$