

# Unit 3 Worksheet 6

## Calculus 1

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

1.  $f(x) = \sin(3x^5)$   
 $f'(x) = \cos(3x^5) \cdot (15x^4)$   
 $f'(x) = (15x^4)\cos(3x^5)$

2.  $f(x) = \cos(4x^4 - 11x)$   
 $f'(x) = -\sin(4x^4 - 11x) \cdot (16x^3 - 11)$   
 $f'(x) = -(16x^3 - 11)\sin(4x^4 - 11x)$

3.  $f(x) = \sin^3 x$   
 $f'(x) = 3\sin^2 x \cos x$

4.  $f(x) = \cos^5 x$   
 $f'(x) = 5\cos^4 x (-\sin x)$   
 $f'(x) = -5\sin x \cos^4 x$

5.  $f(x) = 9\sec^8 x$   
 $f'(x) = 72\sec^7 x \sec x \tan x$   
 $f'(x) = 72\sec^8 x \tan x$

6.  $f(x) = 3\tan(5x^9 - 7)$   
 $f'(x) = 3\sec^2(5x^9 - 7)(45x^8)$   
 $f'(x) = 135x^8 \sec^2(5x^9 - 7)$

7.  $f(x) = 14\sin 3x + 2\cos^7 x$   
 $f'(x) = [14\cos 3x(3)] + [14\cos^6 x (-\sin x)]$   
 $f'(x) = 42\cos 3x - 14\sin x \cos^6 x$

OR

$$f'(x) = 14(3\cos 3x - \sin x \cos^6 x)$$

$$8. \quad f(x) = \tan^2 x + \sec 4x$$

$$f'(x) = [2 \tan x \cdot \sec^2 x] + [\sec 4x \tan 4x \cdot 4]$$

$$f'(x) = 2 \tan x \sec^2 x + 4 \sec 4x \tan 4x$$

*OR*

$$f'(x) = 2(\tan x \sec^2 x + 2 \sec 4x \tan 4x)$$

$$9. \quad f(x) = \sin^6(2x^3)$$

$$f'(x) = 6 \sin^5(2x^3) \cos(2x^3) \cdot 6x^2$$

$$f'(x) = 36x^2 \cos(2x^3) \sin^5(2x^3)$$

$$10. \quad f(x) = \sec^5(4x^3)$$

$$f'(x) = 5 \sec^4(4x^3) \cdot \sec(4x^3) \tan(4x^3) \cdot 12x^2$$

$$f'(x) = 60x^2 \sec^5(4x^3) \tan(4x^3)$$

$$11. \quad f(x) = \sin^6(2x) - \cos^4(2x)$$

$$f'(x) = [6 \sin^5(2x) \cdot \cos(2x) \cdot 2] - [4 \cos^3(2x) \cdot -\sin(2x) \cdot 2]$$

$$f'(x) = 12 \sin^5(2x) \cos(2x) + 8 \cos^3(2x) \sin(2x)$$

*OR*

$$f'(x) = 4 \cos(2x) \sin(2x) [3 \sin^4(2x) + 2 \cos^2(2x)]$$

$$12. \quad f(x) = \cot^9(2x) + \csc^7(2x)$$

$$f'(x) = 9 \cot^8(2x) [-\csc^2(2x)] \cdot 2 + 7 \csc^6(2x) [-\csc(2x) \cot(2x)] \cdot 2$$

$$f'(x) = -18 \cot^8(2x) \csc^2(2x) - 14 \csc^7(2x) \cot(2x)$$

*OR*

$$f'(x) = -2 \cot(2x) \csc^2(2x) [9 \cot^7(2x) + 7 \csc^5(2x)]$$