Calculus   Worksheet #5   Unit 6 Selected Solutions

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

2. $f(x) = \sec(x^2)\tan(x-1)$

$f'(x) = [\sec(x^2)][\sec^2(x-1)](1) + [\tan(x-1)][\sec(x^2)\tan(x^2)](2x)$

$f'(x) = \sec(x^2)\sec^2(x-1) + 2x\tan(x-1)\sec(x^2)\tan(x^2)$

6. $f(x) = \dfrac{2x^3}{\cos(3x)}$

$f'(x) = \dfrac{[\cos(3x)][6x^2] - [2x^3][-\sin(3x)](3)}{\cos^2(3x)}$

$f'(x) = \dfrac{6x^2\cos(3x) + 6x^3\sin(3x)}{\cos^2(3x)}$

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

11. $f(x) = \sec(3x+1)$

$f'(x) = [\sec(3x+1)\tan(3x+1)](3)$ ⟹ $f'(x) = 3\sec(3x+1)\tan(3x+1)$

$f''(x) = [3\sec(3x+1)][\sec^2(3x+1)](3) + [\tan(3x+1)][3\sec(3x+1)\tan(3x+1)](3)$

$f''(x) = 9\sec^3(3x+1) + 9\tan^2(3x+1)\sec(3x+1)$

13. $f(x) = \cot(1 - x^3)$

$f'(x) = [-\csc^2(1-x^3)](-3x^2)$ ⟹ $f'(x) = 3x^2\csc^2(1-x^3)$

$f''(x) = [3x^2][2\csc^1(1-x^3)][-\csc(1-x^3)\cot(1-x^3)](-3x^2) + [\csc^2(1-x^3)][6x]$

$f''(x) = 18x^4\csc^2(1-x^3)\cot(1-x^3) + 6x\csc^2(1-x^3)$

Find dy/dx for each of the following.

18. $\cos(x)\sin(y) = 1 - x^2$

$[\cos(x)][\cos(y)](dy/dx) + [\sin(y)][-\sin(x)] = -2x$

$\cos(x)\cos(y)(dy/dx) = -2x + \sin(y)\sin(x)$

$dy/dx = \dfrac{-2x + \sin(y)\sin(x)}{\cos(x)\cos(y)}$

20. $y^2 = \csc(x) + 3\cot(y)$

$2y(dy/dx) = -\csc(x)\cot(x) + 3[-\csc^2(y)](dy/dx)$

$[2y + 3\csc^2(y)](dy/dx) = -\csc(x)\cot(x)$

$dy/dx = \dfrac{-\csc(x)\cot(x)}{2y + 3\csc^2(y)}$