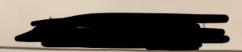# Hon Pre-Calc
Differentiation Quiz   Name _____
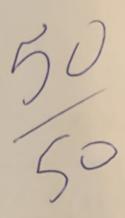
Show All Work!!! Circle All Final Answers!!!

Short Answer

1. **ONLY** Differentiate the following (**DO NOT SIMPLIFY**):

a) $f(x) = \frac{2}{3}x^{3/2} - \frac{3}{4}x^{3/5}$

$$f'(x) = \frac{3}{2}\left(\frac{2}{3}x^{1/2}\right) - \frac{3}{5}\left(\frac{3}{4}x^{-2/5}\right)$$

$\frac{50}{50}$

b) $f(x) = -\frac{3}{x^2} - \frac{4}{x^4}$ $f(x) = -3x^{-2} - 4x^{-4}$

$$f'(x) = -2\left(-3x^{-3}\right) - 4\left(-4x^{-5}\right)$$

c) $f(x) = \left(5x^4 - 3x^2 - 1\right)\left(-5x^2 + 3\right)$

$$f'(x) = \left(20x^3 - 6x\right)\left(-5x^2 + 3\right) + \left(-10x\right)\left(5x^4 - 3x^2 - 1\right)$$

1

d) $f(x) = (5x + 7)(2x - 3)(9x - 1)$

$$f'(x) = (5)(2x-3)(9x-1) + (2)(5x+7)(9x-1) + (9)(5x+7)(2x-3)$$

e) $f(x) = \dfrac{9x^2 + 8x - 3}{11x^2 - 7}$

$$f'(x) = \dfrac{(18x+8)(11x^2-7) - (9x^2+8x-3)(22x)}{(11x^2-7)^2}$$

f) $f(x) = \dfrac{4x^4 - 4x^2 + 5}{2x^{5/3} + 3}$

$$f'(x) = \dfrac{(16x^3 - 8x)(2x^{5/3}+3) - \left(\dfrac{10}{3}x^{2/3}\right)(4x^4 - 4x^2 + 5)}{(2x^{5/3}+3)^2}$$

$$f(x) = x^2 \left(\sin(5x^2) \right)^2$$

g) $f(x) = x^2 \sin^2(5x^2)$

$$f'(x) = 2x \sin^2(5x^2) + x^2 \, 2\left(\sin(5x^2)\right)\left(\cos(5x^2)\right)(10x)$$

h) $f(x) = \dfrac{\tan(2x)}{\sqrt{\csc(x^4)}}$ $\left(\csc(x^4)\right)^{\frac{1}{2}}$

$$f'(x) = \dfrac{2\sec^2(2x)\sqrt{\csc(x^4)} \quad - \quad \tan(2x)\frac{1}{2}\left(\csc(x^4)\right)^{-\frac{1}{2}}\left(-\csc x^4\right)\left(\cot x^4\right)\left(4x^3\right)}{\left(\sqrt{\csc(x^4)}\right)^2}$$

2. Differentiate the following: (NUMERATORS must be in FACTORED FORM and ALL factors MUST be COMPLETELY SIMPLIFIED POLYNOMIALS)

a) $f(x) = \dfrac{(x^3+4)^5}{3x^4-2}$

$f'(x) = \dfrac{(x^3+4)^4 (15x^2)(3x^4-2) - (x^3+4)^5(12x^3)}{(3x^4-2)^2}$

$f'(x) = \dfrac{3x^2(x^3+4)^4\left[5(3x^4-2) - (x^3+4)(4x)\right]}{(3x^4-2)^2}$

$\boxed{f'(x) = \dfrac{3x^2(x^3+4)^4(11x^4-16x-10)}{(3x^4-2)^2}}$

$15x^4-10 - \left(4x^4+16x\right)$

$15x^4-10 - 4x^4 -16x$

$11x^4 -16x +10$

b) $f(x) = \dfrac{\sqrt[3]{4x^2+5x-2}}{2x^2+5} \cdot \dfrac{(4x^2+5x-2)^{\frac{1}{3}}}{2x^2+5}$

$f'(x) = \dfrac{\frac{1}{3}(4x^2+5x-2)^{-2/3}(8x+5)(2x^2+5) - (4x^2+5x-2)^{\frac{1}{3}}(4x)}{(2x^2+5)^2}$

$f'(x) = \dfrac{\frac{1}{3}(4x^2+5x-2)^{-2/3}\left[(8x+5)^{(2x^2+5)} - (4x^2+5x-2)(12x)\right]}{(2x^2+5)^2}$

$\boxed{f'(x) = \dfrac{-32x^3-50x^2+64x+25}{3(4x^2+5x-2)^{2/3}(2x^2+5)^2}}$

$16x^3+10x^2+40x+5+48x^3+$ 29
$-32x^3-50x$

$(16x^3 + 10x^2+40x+25) -$
$(48x^3+60x^2-24x)$

$-32x^3-50x^2+64x+25$

4