

**General Instructions:** Use the shortcut rules for all derivatives. If there is any work to show, show it! 16 pts ea

1. Find the derivative. You do NOT need to simplify your answer, just do the calculus!

a)  $y = \frac{3x^4 - 7}{x^2 - 8x + 5}$

$$y' = \frac{(12x^3)(x^2 - 8x + 5) - (2x - 8)(3x^4 - 7)}{(x^2 - 8x + 5)^2}$$

b)  $y = (3x^5 - 7x + 2)^8$

$$y' = 8(3x^5 - 7x + 2)^7 (15x^4 - 7)$$

c)  $y = \sqrt{5x^7 - 1} = (5x^7 - 1)^{1/2}$

$$y' = \frac{1}{2} (5x^7 - 1)^{-1/2} (35x^6)$$

DB

2. Find the derivative. You do NOT need to simplify your answer, just do the calculus!

a)  $y = \frac{(x^3 - 5)^6}{2x}$

$$y' = \frac{\overbrace{6(x^3-5)^5}^{f'} \cdot \underbrace{(3x^2)}_g \cdot \underbrace{(2x)}_g - \underbrace{2(x^3-5)^6}_{g'} \cdot \underbrace{1}_f}{(2x)^2}$$

$$y' = \frac{6(x^3-5)^5(3x^2)(2x) - 2(x^3-5)^6}{(2x)^2}$$

$$y' = \frac{\quad}{g^2}$$

SH, DB

b)  $y = [x^3(3 - 2x^5)]^{-4}$  or  $y = (3x^3 - 2x^8)^{-4}$

$$y' = -4[x^3(3 - 2x^5)]^{-5} (3x^2(3 - 2x^5) + (-10x^4)x^3)$$

$$\text{or } y' = -4(3x^3 - 2x^8)^{-5} (9x^2 - 16x^7)$$

c) DB, BL  
 $y = (7x^5)(\sqrt[3]{2x^3 - 4}) = (7x^5)(2x^3 - 4)^{1/3}$

$$y' = \underbrace{(35x^4)}_{f'} \cdot \underbrace{(2x^3 - 4)^{1/3}}_g + \underbrace{\frac{1}{3}(2x^3 - 4)^{-2/3}}_{g'} \cdot \underbrace{(6x^2)}_f \cdot \underbrace{(7x^5)}_f$$

**General Instructions:** Use the shortcut rules for all derivatives. If there is any work to show, show it! 16 pts ea

1. Find the derivative. You do NOT need to simplify your answer, just do the calculus!

a)  $y = (2x^{-3} + 4x - 7)^{-5}$

$$y' = -5(2x^{-3} + 4x - 7)^{-6} (-6x^{-4} + 4)$$

b)  $y = \sqrt[5]{3x^4 + 2} = (3x^4 + 2)^{1/5}$

$$y' = \frac{1}{5}(3x^4 + 2)^{-4/5} (12x^3)$$

BF, KD

c)  $y = \frac{5x}{(4 - 7x^3)^4}$

$$y' = \frac{5(4 - 7x^3)^4 - 4(4 - 7x^3)^3(-21x^2)(5x)}{[(4 - 7x^3)^4]^2}$$

or...  $y = 5x(4 - 7x^3)^{-4} \Rightarrow y' = 5(4 - 7x^3)^{-4} + (5x)(-4)(4 - 7x^3)^{-5}(-21x^2)$

2. Find the derivative. You do NOT need to simplify your answer, just do the calculus!

a)  $y = \frac{4x^5 + 1}{x^3 + 7x - 1}$  *DS, BF, KD, Tyler*

$$y' = \frac{20x^4(x^3 + 7x - 1) - (3x^2 + 7)(4x^5 + 1)}{(x^3 + 7x - 1)^2}$$

b)  $y = (4x^3)(\sqrt[4]{1 - 2x^5}) = (4x^3)(1 - 2x^5)^{1/4}$  *DS, NC, BF, JM*

$$y' = (12x^2)(1 - 2x^5)^{1/4} + \frac{1}{4}(1 - 2x^5)^{-3/4}(-10x^4)(4x^3)$$

c)  $y = [x^4(x^5 - 9)^{-3}]^7$  *JM?*

$$y' = 7[x^4(x^5 - 9)^{-3}]^6 \left[ \underbrace{4x^3}_{f'} \underbrace{(x^5 - 9)^{-3}}_g + (-3)(x^5 - 9)^{-4} \underbrace{(5x^4)}_{g'} \cdot x^4 \right]$$