

Name: KEY**Read all directions and problems carefully! Show all appropriate work for credit.**

1. Use the Product, Quotient, and/or Chain Rules to find the derivatives.

$$y = x^3(x^5 - 7)^{-4} \Rightarrow \text{CHAIN W/IN PRODUCT} \quad y = (-2x^4 + x^2)^{-1} \Rightarrow \text{CHAIN}$$

$$\frac{dy}{dx} = 3x^2(x^5 - 7)^{-4} + x^3[-4(x^5 - 7)^{-5}(5x^4)]$$

$$= 3x^2(x^5 - 7)^{-4} - 20x^7(x^5 - 7)^{-5}$$

+4

$$\frac{dy}{dx} = -1(-2x^4 + x^2)^{-2}(-8x^3 + 2x)$$

$$= (8x^3 - 2x)(-2x^4 + x^2)^{-2}$$

+3

$$y = -7x(2x^3 - 5)^{\frac{3}{2}} \Rightarrow \text{CHAIN W/IN PRODUCT}$$

$$\frac{dy}{dx} = -7(2x^3 - 5)^{\frac{3}{2}} + (-7x)\left[\frac{3}{2}(2x^3 - 5)^{\frac{1}{2}}(6x^2)\right]$$

$$= -7(2x^3 - 5)^{\frac{3}{2}} - 63x^3(2x^3 - 5)^{\frac{1}{2}}$$

+4

OR

$$= -7(2x^3 - 5)^{\frac{1}{2}}[11x^3 - 5]$$

$$y = \frac{x^3}{\sqrt{3x+1}}$$

$$\frac{dy}{dx} = \frac{3x^2(3x+1)^{\frac{1}{2}} - x^3\left[\frac{1}{2}(3x+1)^{-\frac{1}{2}}(3)\right]}{(\sqrt{3x+1})^2}$$

$$= \frac{3x^2(3x+1)^{\frac{1}{2}} - \frac{3}{2}x^3(3x+1)^{-\frac{1}{2}}}{3x+1}$$

OR, QUITE CLEARLY,

$$= \frac{15x^3 + 6x^2}{(3x+1)^{\frac{3}{2}}}$$

+4

15