Calculus Quiz
Chain Rule Practice

Name key
Date

Please show all work for full credit.

Differentiate:

1) $y=(2x-5)^{-1}(x^2-5x)^6$

$\frac{dy}{dx} = -1(2x-5)^{-2}(2)(x^2-5x)^6 + (2x-5)^{-1}(6)(x^2-5x)^5(2x-5)$

$(2(x^2-5x)^5)\left(-\frac{(x^2-5x)}{(2x-5)^1}+3\right) = \frac{-2(x^2-5x)^6}{(2x-5)^2} + 6(x^2-5x)^5$

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

$\frac{dy}{dx} = -35(4x^3+2)^4(12x^2) = -420x^2(4x^3+2)^4$

$\frac{35}{12x}$

$3x^{-1}$

$\frac{1}{5}x \quad \frac{1}{5}x^{-1}$

$\frac{1}{5}$

$\frac{1}{5}x^{-1}$

$-\frac{1}{5}x^{-2}$

3) $y=\left(\frac{x}{5}+\frac{1}{5x}\right)^2$

$\frac{dy}{dx} = 2\left(\frac{x}{5}+\frac{1}{5}x\right)\left(\frac{1}{5}-\frac{1}{5x^2}\right)$

4) $y=\frac{(3x-5)^4}{3x^2-4}$ $\frac{dy}{dx} = \frac{4(3x-5)^3(3)(3x^2-4)-(3x-5)^4(6x)}{(3x^2-4)^2} = \frac{6(3x-5)^3(6x^2-8-3x^2+5)}{(3x^2-4)^2}$

$= \frac{6(3x^2-5)^3(3x^2+5x-8)}{(3x^2-4)^2}$

5) $y=\sqrt{x}+(3x+1)^2$

$\frac{dy}{dx} = \frac{1}{2\sqrt{x}} + 2(3x+1)3$

$= \frac{1}{2\sqrt{x}} + 18x + 6$

6) $y = 3x(6x^2 - 4)^3$

$\frac{dy}{dx} = 3(6x^2-4)^3 + (3x)(3(6x^2-4)^2(12x))$

$= 3(6x^2-4)^3 + 36x^2(6x^2-4)^2$

$= 3(6x^2-4)^2(6x^2-4 + 12x^2) = 3(6x^2-4)^2(18x^2-4)$

7) $y = 12\sqrt{4x^3+2x} = 12(4x^3+2x)^{1/2}$

$\frac{dy}{dx} = 6(4x^3+2x)^{-1/2}(12x^2+2) = \frac{72x^2+12}{\sqrt{4x^3+2x}}$

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

$\frac{dy}{dx} = 3x^2(3x+2)^5 + x^3(5)(3x+2)^4(3) = 3x^2(3x+2)^5 + 15x^3(3x+2)^4$

$= 3x^2(3x+2)^4(3x+2+5x) = 3x^2(3x+2)^4(8x+2)$

9) $y = \left(\frac{x}{2} - 1\right)^{-10}$

$\frac{dy}{dx} = -10\left(\frac{x}{2}-1\right)^{-11}\left(\frac{1}{2}\right) = \frac{-5}{\left(\frac{x}{2}-1\right)^{11}}$

10) $y = \frac{(-2x^2+3x)^3}{x-5}$

$\frac{dy}{dx} = \frac{3(-2x^2+3x)^2(-4x+3)(x-5) - (-2x^2+3x)^3(1)}{(x-5)^2}$

$-4x^2+3x+20x-15$

$-4x^2+23x-15$

$-12x^2+69x-45$

$= \frac{(-2x^2+3x)^2(-12x^2+69x-45+2x^2-3x)}{(x-5)^2}$

$= \frac{(-2x^2+3x)^2(-10x^2+66x-45)}{(x-5)^2}$