Student: Cole Lamers **Date:** 09/06/19	**Instructor:** Viktoriya Shcherban **Course:** Calc 1 11:30 AM / Internet (81749&81750) Shcherban	**Assignment:** 3.3 Differentiation Rules

1. Find the first and second derivatives.

$$y = -8x^4 - 5$$

$$\frac{dy}{dx} = \boxed{-32x^3}$$

$$\frac{d^2y}{dx^2} = \boxed{-96x^2}$$

2. Find the first and second derivatives.

$$s = 5t^3 - 3t^5$$

$$\frac{ds}{dt} = \boxed{15t^2 - 15t^4}$$

$$\frac{d^2s}{dt^2} = \boxed{30t - 60t^3}$$

3. Find the first and second derivatives.

$$y = 2x^{-7} - \frac{6}{x}$$

$$\frac{dy}{dx} = \boxed{-\frac{14}{x^8} + \frac{6}{x^2}}$$

$$\frac{d^2y}{dx^2} = \boxed{\frac{112}{x^9} - \frac{12}{x^3}}$$

4. Find the first and second derivatives.

$$y = 3x^2 - 13x - 8x^{-3}$$

$$\frac{dy}{dx} = \boxed{6x - 13 + 24x^{-4}}$$

$$\frac{d^2y}{dx^2} = \boxed{6 - \frac{96}{x^5}}$$

5. Find the first and second derivatives.

$$r = \frac{1}{4s^3} - \frac{7}{3s^2}$$

$$\frac{dr}{ds} = \boxed{-\frac{3}{4s^4} + \frac{14}{3s^3}}$$

$$\frac{d^2r}{ds^2} = \boxed{\frac{3}{s^5} - \frac{14}{s^4}}$$

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6. Find y' by **(a)** applying the product rule and **(b)** multiplying the factors to produce a sum of simpler terms to differentiate.

$$y = \left(6 - x^2\right)\left(x^3 - 2x + 3\right)$$

(a) Find y' by applying the product rule. Fully expand your answer.

$y' = \boxed{-5x^4 + 24x^2 - 6x - 12}$

(b) Find y' by multiplying the factors to produce a sum of simpler terms to differentiate.

$y' = \boxed{-5x^4 + 24x^2 - 6x - 12}$

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7. Find y' by applying the Product Rule, and then find y' by multiplying the factors to produce a sum of simpler terms to differentiate.

$$y = (7x^2 + 6)\left(3x - 4 + \frac{5}{x}\right)$$

$y' = \boxed{63x^2 - 56x + 53 - \frac{30}{x^2}}$

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8. Find the derivative of the function.

$$y = \frac{6x - 1}{3x + 7}$$

The derivative is $y' = \boxed{\dfrac{45}{(3x + 7)^2}}$.

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9. Find the derivative of the function.

$$y = \frac{8x - 7}{x^2 + 6x}$$

$y' = \boxed{\dfrac{-8x^2 + 14x + 42}{\left(x^2 + 6x\right)^2}}$

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10. Find the derivative of the function.

$$y = \frac{4x^2 + 9}{x^2 + 8}$$

$$y' = \boxed{\frac{46x}{\left(x^2 + 8\right)^2}}$$

11. Find the derivative of the function.

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

$$\frac{dy}{dt} = \boxed{-\frac{28}{(2t - 6)^2}}$$

12. Find the derivative of the function.

$$f(s) = \frac{\sqrt{s} - 1}{\sqrt{s} + 1}$$

Choose the correct answer below.

A. $\dfrac{1}{\left(\sqrt{s} + 1\right)^2}$

B. ✔ $\dfrac{1}{\sqrt{s}\left(\sqrt{s} + 1\right)^2}$

C. $\dfrac{1}{\sqrt{s}\left(\sqrt{s} - 1\right)^2}$

D. $\dfrac{1}{\left(\sqrt{s} - 1\right)^2}$

13. Find the derivative of all orders of the function.

$$y = \frac{x^4}{4} + \frac{8}{9}x^3 - x^2 + 4x - 1$$

$$y' = \boxed{x^3 + \frac{8}{3}x^2 - 2x + 4}$$

$$y'' = \boxed{3x^2 + \frac{16}{3}x - 2}$$

$$y''' = \boxed{6x + \frac{16}{3}}$$

$$y^{(4)} = \boxed{6}$$

$$y^{(5)} = \boxed{0}$$

14. Find the derivatives of all orders of the following function.

$$y = (x - 5)(x + 4)(x + 5)$$

$y' =$ $3x^2 + 8x - 25$

$y'' =$ $6x + 8$

$y''' =$ 6

$y^{(4)} =$ 0

All higher derivatives of order greater than 4 are 0 .

15. Find the first and second derivatives.

$$y = \frac{4x^3 + 6}{x}$$

$y' =$ $8x - \dfrac{6}{x^2}$

$y'' =$ $8 + 12x^{-3}$