Chapter 2 Practice Test Part 1 (complete all problems)

#1 – 13: Use the appropriate technique to find the derivatives of the following functions.

1) 
$$f(x) = 3x^2 - 5x + 4$$

This should be solved using the power rule.

$$f'(x) = \frac{d}{dx}(3x^2) - \frac{d}{dx}(5x) + \frac{d}{dx}(4)$$
$$f'(x) = 2 \cdot 3x^{1} - 5 + 0$$
$$f'(x) = 6x - 5$$

Answer: f'(x) = 6x - 5

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

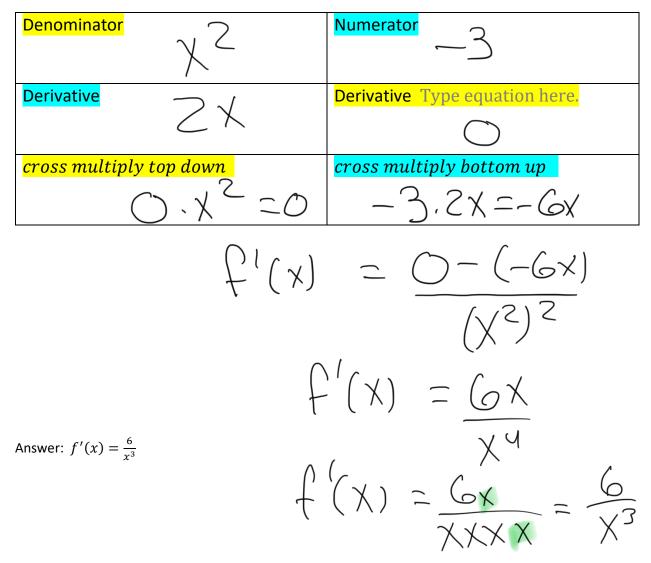
$$\int_{-\infty}^{\infty} \left( \chi \right) = -\int_{-\infty}^{\infty} \chi - \chi^{-2}$$
This can be done by rewriting and then using the power rule,

or 
$$f'(x) = -2 - 3x^{-2-1}$$

You do not rewrite and use the quotient rule

 $f'(\chi) = G\chi^{-3}$ REWRITE AND USE POWER RULE METHOD  $f'(\chi) = \frac{G}{\sqrt{3}}$ 

## QUOTIENT RULE METHOD



3) 
$$f(x) = 2\sqrt[3]{x^2}$$

This needs to be done by rewriting and then using the power rule,

$$f'(x) = 2x^{2/3}$$

$$f'(x) = \frac{2}{3} \cdot 2x^{2/3-3/3}$$

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

$$f'(x) = \frac{4}{3} \cdot \frac{1}{x^{1/3}}$$
Answer:  $f'(x) = \frac{4}{3\sqrt{x}}$ 

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4) 
$$f(x) = \frac{5x^2 + 3}{x^2} \qquad f(\chi) = \frac{5\chi^2}{\chi^2} + \frac{3}{\chi^2}$$

This can be done by rewriting and then using the power rule,

Or

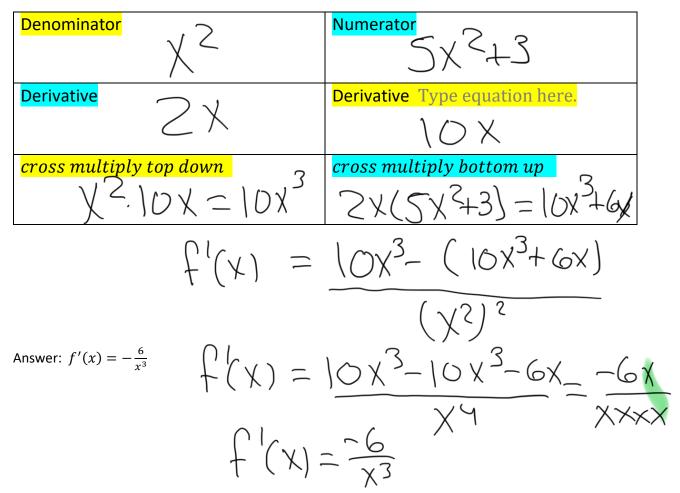
You do not rewrite and use the quotient rule  $f(\chi) = 3\chi^{-2} + 5$ 

REWRITE AND USE POWER RULE METHOD

 $f'(x) = -3x^{2-1} + 0$   $f'(x) = -6x^{-3}$   $f'(x) = -6x^{-3}$ 

 $f(x) = 5 + 3x^{-c}$ 

QUOTIENT RULE METHOD

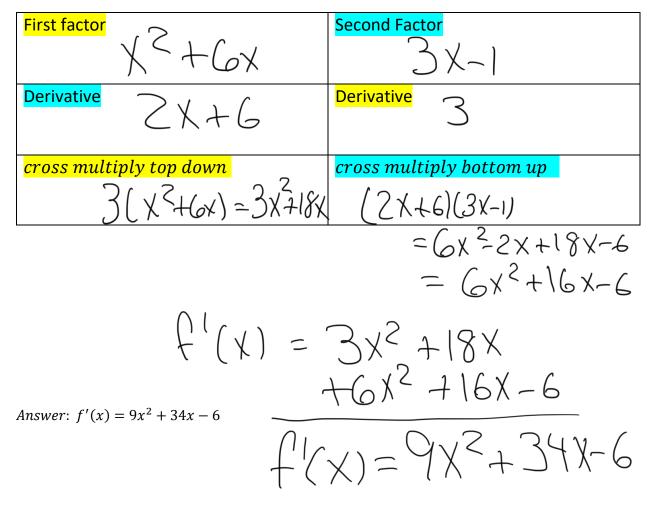


5) 
$$f(x) = (x^2 + 6x)(3x - 1)$$

This can be done by rewriting and then using the power rule,

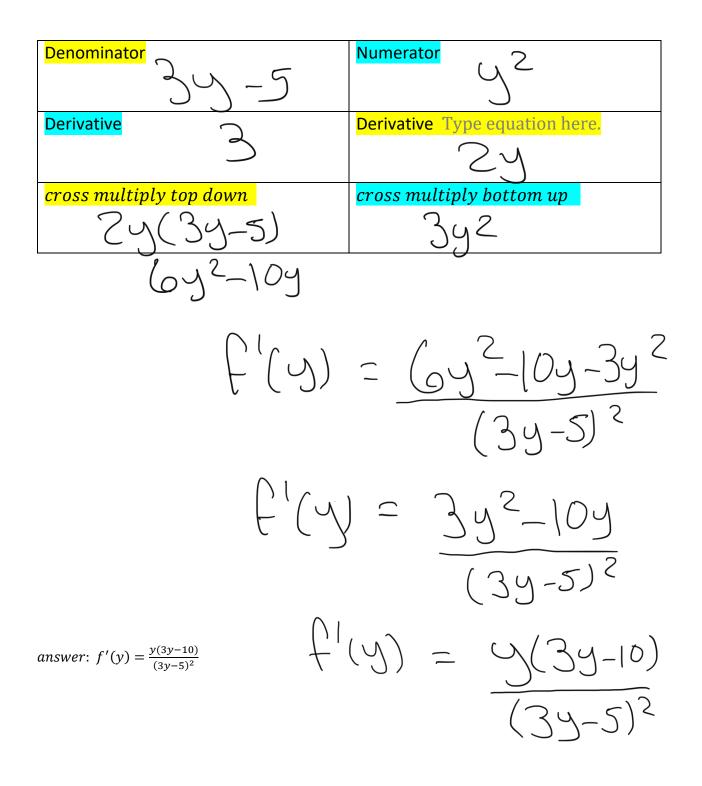
Or 
$$F \chi^2, 3\chi \circ \chi^2, -l \sigma_{\chi,3\chi} \circ \chi^2, -l \sigma_{\chi,3\chi$$

PRODUCT RULE METHOD



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

You must use the quotient rule for this derivative.



7) 
$$f(t) = 2(4t-3)^5$$

This is a chain rule problem.

CHAIN RULE short cut to find a derivative of a problem written in the form:

$$f(x) = a(inside parenthesis)^{n}$$

$$f'(x) = n * a * (derivative of inside of parenthesis)^{n-1}$$

$$Q = Z$$

$$M = 5$$

$$DerivAtive Distribution Parenthesis's 4$$

$$f'(x) = 5 \cdot 2 \cdot 4 (4T - 3)^{4}$$
Answer:  $f'(t) = 40(4t - 3)^{4}$ 

$$f'(x) = 40(4t - 3)^{4}$$

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

This is first a product rule problem. You will need to use the chain rule as one derivative in the power rule.

First factor 
$$4 \chi^{3}$$
 Second Factor  $(5\chi+2)^{2}$   
Derivative  $12\chi^{2}$  Derivative  $2.5(5\chi+2) = [0(5\chi+2)]$   
cross multiply top down  $12\chi^{2}(5\chi+2)^{2}$   
 $4\chi^{3} | b (5\chi+2) | 2\chi^{2}(5\chi+2)^{2}$   
 $\int = 40\chi^{3}(5\chi+3) + (2\chi^{2}(5\chi+3)^{2})$   
 $= 4(10\chi^{3}(5\chi+3) + (2\chi^{2}(5\chi+3)^{2}))$   
 $= 4\chi^{2}(10\chi(5\chi+3) + 3\chi^{2}(5\chi+3)^{2})$   
 $= 4\chi^{2}(10\chi(5\chi+3) + 3(5\chi+3)^{2})$   
 $= 4\chi^{2}(5\chi+3)(10\chi + 3(5\chi+3))$   
 $\int b\chi^{1} = 4\chi^{2}(5\chi+3)(25\chi+9)$ 

9)  $f(x) = x^2 + 3x$ ; at x = 2

a) Find the slope of the tangent line to the graph of the function for the given value of x.

b) Find the equation of the tangent line to the graph of the function for the given value of x.

10)  $f(x) = x^2 + 8x - 4$ 

10a)

a) Find all values of x where the tangent line is horizontal

b) Find the equation of the tangent line to the graph of the function for the values of x found in part a.

(a) 
$$f'(x) = 2x+8$$
  
 $2x=-8$   
 $x=-4$   
(b)  $y coord Point$   
 $y = f(-4) = (-4)^{2} + 8(-4) - 9$   
 $= -20$   
Point  $(-4)^{-2} - 9$   
All horizantal lines  
have  $M=0$   
 $y = -20 = 0(x - (-4))$   
 $y = -20 = 0(x - (-4))$   
 $y = -20 = 0$ 

Chapter 2 Practice Test Part 2

11) 
$$f(x) = e^{x^2}$$

Rule needed

$$f(x) = c e^{g(x)}$$

$$f'(x) = cg'(x)e^{g(x)}$$

Where "c" is a constant (number without a letter)

$$C = I$$
  

$$\Im(\chi) = \chi^{2}$$
  
Answer:  $f'(x) = 2xe^{x^{2}}$   

$$\int_{-1}^{1} (\chi) = \int_{-2}^{-2} \chi e^{\chi^{2}}$$
  

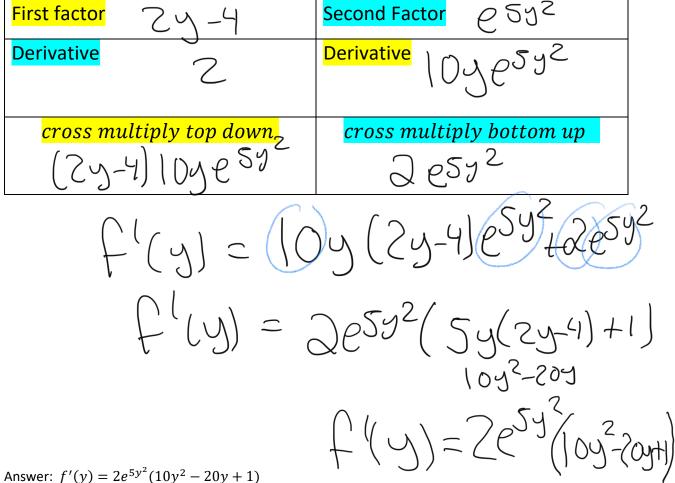
$$\int_{-2}^{1} (\chi) = 2\chi e^{\chi^{2}}$$

12)  $f(y) = (2y - 4)e^{5y^2}$ 

This is a product rule problem. We will need to find an "e" derivative during the product rule.

Rule needed for the "e"  $f(x) = ce^{g(x)}$   $f'(x) = cg'(x)e^{g(x)}$ Where "c" is a constant (number without a letter)

Also need the product rule as both factors have an x.



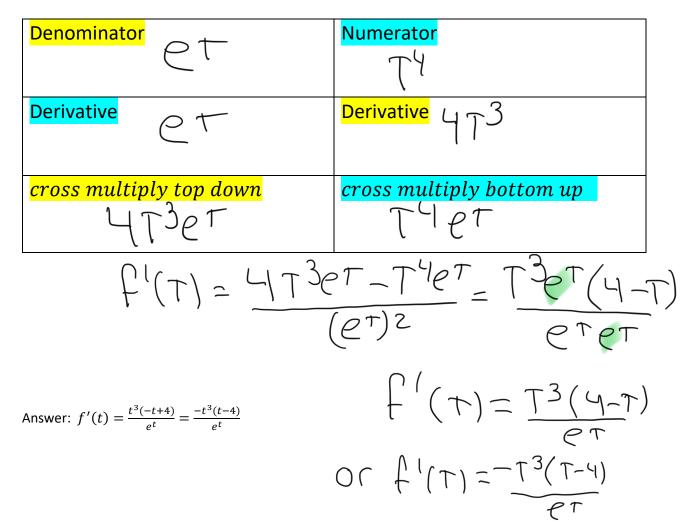
(10y - 20y + 1)

13) 
$$f(t) = \frac{t^4}{e^t}$$

This is a product rule problem. We will need to find an "e" derivative during the product rule.

Rule needed for the "e"  $f(x) = ce^{g(x)}$   $f'(x) = cg'(x)e^{g(x)}$ Where "c" is a constant (number without a letter)

Also need the quotient rule because of the division.



14) 
$$f(t) = \ln(3t^5)$$

## Rule needed

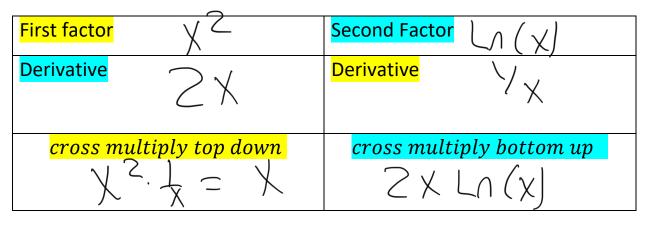
f(x) = cln[g(x)] $f'(x) = \frac{cg'(x)}{g(x)}$ c is a constant

15) 
$$y = x^2 ln(x)$$

This is a product rule problem. We will need to find an "In" derivative during the product rule.

Rule needed for In f(x) = cln[g(x)]  $f'(x) = \frac{cg'(x)}{g(x)}$ c is a constant

Also need product rule



$$y_1 = \chi + 2\chi Ln(\chi)$$
  
 $y_1 = \chi (1 + 2Ln(\chi))$ 

Answer: 
$$\frac{dy}{dx} = x + 2x ln(x)$$
 or  $x(1 + 2 ln(x))$  or  $x(2 ln(x) + 1)$ 

16)  $f(x) = e^{x^2}$ 

a) Find all values of x where the tangent line is horizontal

b) Find the equation of the tangent line to the graph of the function for the values of x found in part a.

a) Find derivative, then solve derivative equal to zero.

Rule needed for the derivative  $f(x) = c e^{g(x)}$  $f'(x) = cg'(x)e^{g(x)}$ Where "c" is a constant (number without a letter)  $(A) f(X) = e^{\chi^2} f'(X) = e^{\chi^2} \chi^2$   $f'(X) = e^{\chi^2} \chi^2$   $2\chi e^{\chi^2} = 0$   $\chi^2 = 0$ 16b) y = 1  $\chi \square O$ 16a) x = 0) Scoord point S=f(0)=e02=e0=1 POINT (0,1) M=O All horizonTAl lines have slope 0 J-1=0 (X-0) Answer y=1 J-1=0 PART b J=1

17) Suppose that the cost in dollars to make x super-sized candy bars is given by:  $C(x) = \ln(x) + 0.15x$ 

a) Find C(4) (round to 2-decimals)

$$C(\mathcal{A}) \simeq L \wedge (\mathcal{A}) + O_1 S(\mathcal{A}) \simeq L \cdot 9 \mathcal{B} \mathcal{L}$$
  
b) Interpret your answer to part a. 
$$C(\mathcal{A}) = 1.9 \mathcal{B}$$

c) Create the marginal cost function C'(x) for this product.

$$C^{1}(x) = \pm + 0.15$$

d) Find C'(4) (round to 2 decimals)

$$C'(4) = \frac{1}{4} + 0.15 = 0.40$$

See below

e) Interpret your answer to question part d.

Answers: 17a) C(4) = 1.99

17b) It will cost \$1.99 to make 4 super-sized candy bars.

17c) 
$$C'(x) = \frac{1}{x} + .15$$

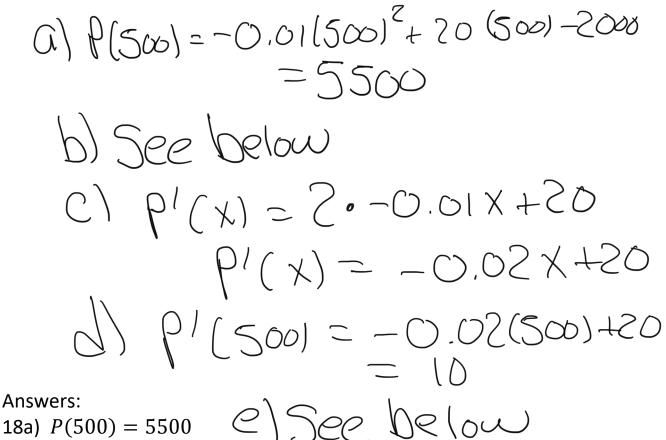
17d) C'(4) = 0.40

17e) It will cost \$0.40 or 40 cents to make the 5<sup>th</sup> candy bar.

18) A Corporation determines the weekly profit (P(x)) from selling certain widget in produces and sells:

 $P(x) = -0.01x^2 + 20x - 2000 \ 0 \le x \le 1000.$ 

- a) Find P(500)
- b) Interpret your answer to part a. (round your answer to 2 decimals)
- c) Create the marginal profit function P'(x) for this product.
- d) Find P'(500).
- e) Interpret your answer to part d.



Answers:

else below

18b) Profit will be \$5500 in a week when 500 widgets are produced and sold.

18c) 
$$P'(x) = -0.02x + 20$$

18d) P'(500) = 10

18e) Company will earn an additional \$10 in profit when 501<sup>st</sup> widget is produced and sold.