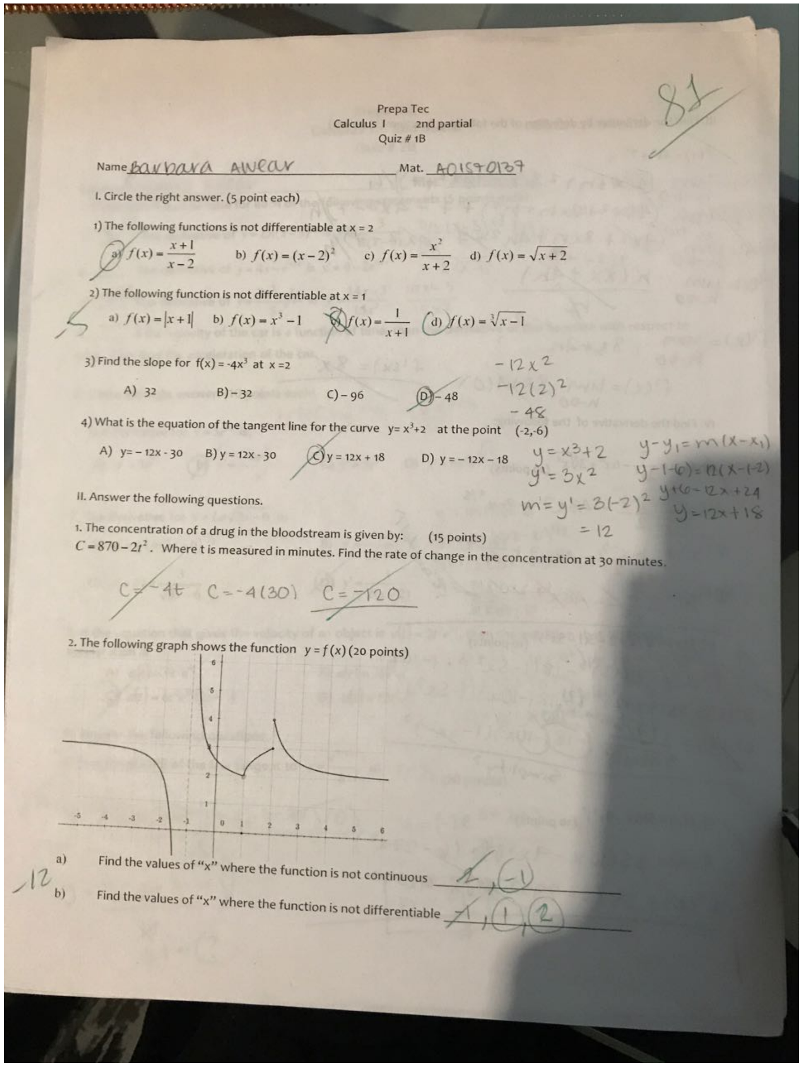
SECOND PARTIAL

QUIZZES

QUIZ 1



Prepa Tec
Calculus I 2nd partial
Quiz # 1B

Name ______ Mat. ______

I. Circle the right answer. (5 point each)

1) The following functions is not differentiable at x = 2

a) $f(x)=\frac{x+1}{x-2}$ b) $f(x)=(x-2)^2$ c) $f(x)=\frac{x^2}{x+2}$ d) $f(x)=\sqrt{x+2}$

2) The following function is not differentiable at x = 1

a) $f(x)=|x+1|$ b) $f(x)=x^3-1$ c) $f(x)=\frac{1}{x+1}$ d) $f(x)=\sqrt[3]{x-1}$

3) Find the slope for $f(x)=-4x^3$ at x = 2

A) 32 B) – 32 C) – 96 D) – 48

4) What is the equation of the tangent line for the curve $y=x^3+2$ at the point (-2,-6)

A) y = – 12x - 30 B) y = 12x - 30 C) y = 12x + 18 D) y = – 12x – 18

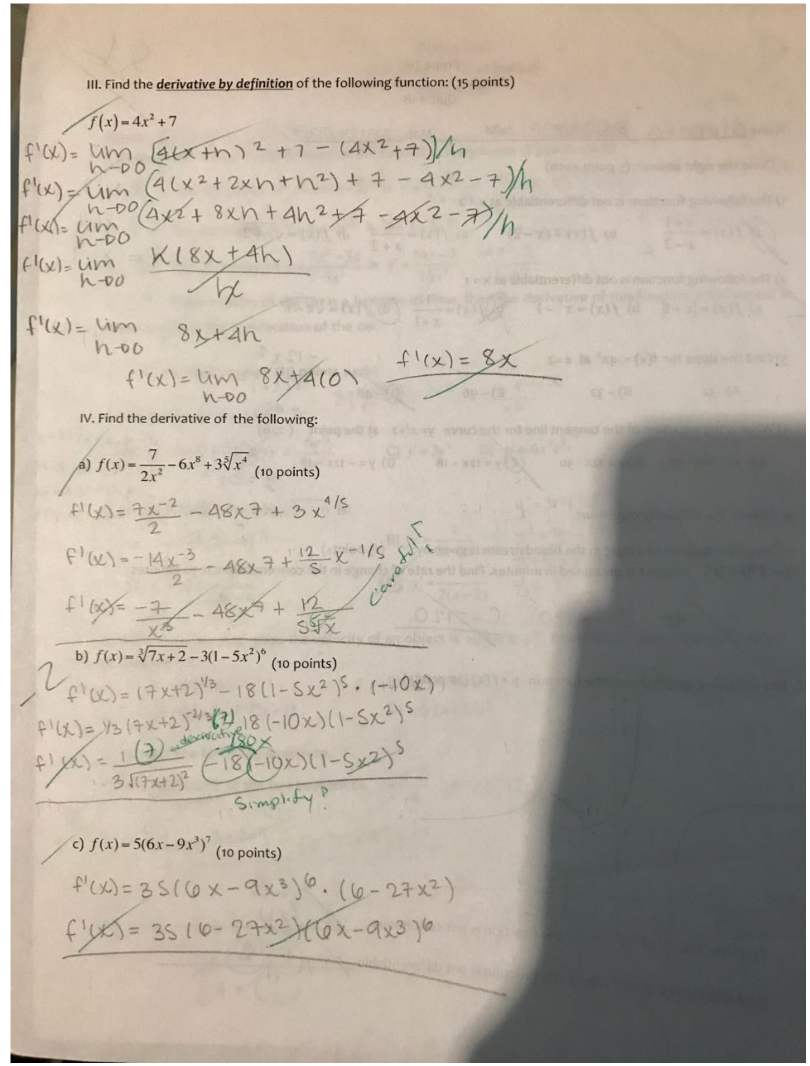
II. Answer the following questions.

1. The concentration of a drug in the bloodstream is given by: (15 points)
$C=870-2t^2$. Where t is measured in minutes. Find the rate of change in the concentration at 30 minutes.

2. The following graph shows the function $y=f(x)$ (20 points)

a) Find the values of "x" where the function is not continuous ______

b) Find the values of "x" where the function is not differentiable ______



III. Find the **derivative by definition** of the following function: (15 points)

$f(x)=4x^2+7$

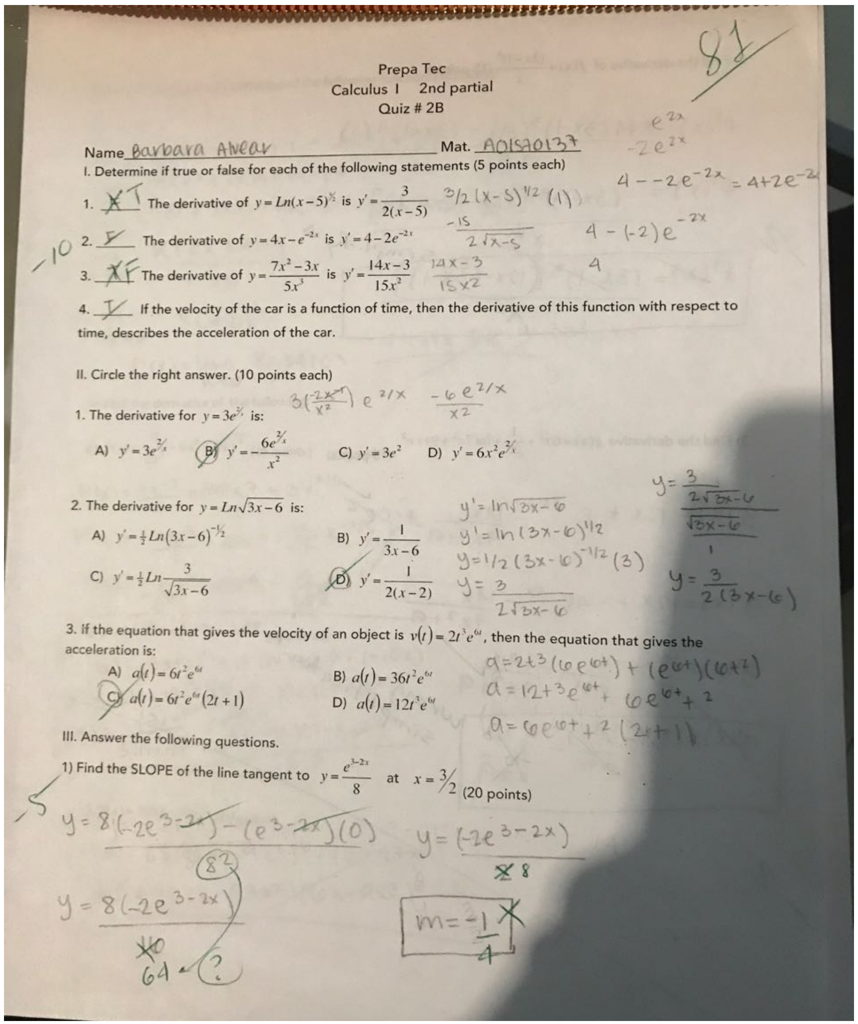
IV. Find the derivative of the following:

a) $f(x)=\frac{7}{2x^2}-6x^8+3\sqrt[5]{x^4}$ (10 points)

b) $f(x)=\sqrt[3]{7x+2}-3(1-5x^2)^6$ (10 points)

c) $f(x)=5(6x-9x^3)^7$ (10 points)

QUIZ 2



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Prepa Tec
Calculus I 2nd partial
Quiz # 2B

Name Barbara Alvear Mat. A01570137

I. Determine if true or false for each of the following statements (5 points each)

1. X T The derivative of $y = Ln(x-5)^{3/2}$ is $y' = \frac{3}{2(x-5)}$

2. F The derivative of $y = 4x - e^{-2x}$ is $y' = 4 - 2e^{-2x}$

3. X F The derivative of $y = \frac{7x^2 - 3x}{5x^3}$ is $y' = \frac{14x-3}{15x^2}$

4. T If the velocity of the car is a function of time, then the derivative of this function with respect to time, describes the acceleration of the car.

-10

II. Circle the right answer. (10 points each)

1. The derivative for $y = 3e^{2/x}$ is:

A) $y' = 3e^{2/x}$ (B) $y' = -\frac{6e^{2/x}}{x^2}$ C) $y' = 3e^2$ D) $y' = 6x^2e^{2/x}$

2. The derivative for $y = Ln\sqrt{3x-6}$ is:

A) $y' = \frac{1}{2}Ln(3x-6)^{-1/2}$ B) $y' = \frac{1}{3x-6}$

C) $y' = \frac{1}{2}Ln\frac{3}{\sqrt{3x-6}}$ (D) $y' = \frac{1}{2(x-2)}$

3. If the equation that gives the velocity of an object is $v(t) = 2t^3e^{6t}$, then the equation that gives the acceleration is:

A) $a(t) = 6t^2e^{6t}$ B) $a(t) = 36t^2e^{6t}$

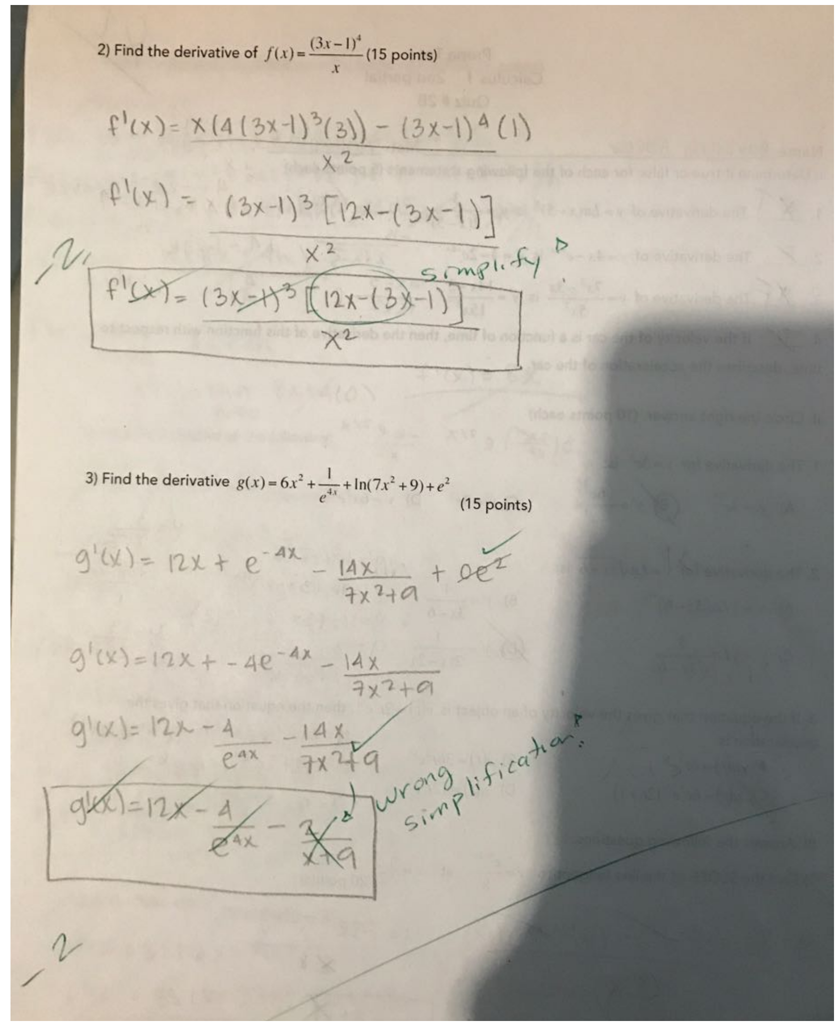
(C) $a(t) = 6t^2e^{6t}(2t+1)$ D) $a(t) = 12t^3e^{6t}$

III. Answer the following questions.

1) Find the SLOPE of the line tangent to $y = \frac{e^{3-2x}}{8}$ at $x = 3/2$ (20 points)

-5

m = -1/4



2) Find the derivative of $f(x) = \frac{(3x-1)^4}{x}$ (15 points)

$f'(x) = \frac{x(4(3x-1)^3(3)) - (3x-1)^4(1)}{x^2}$

$f'(x) = \frac{(3x-1)^3[12x-(3x-1)]}{x^2}$

$f'(x) = \frac{(3x-1)^3[12x-(3x-1)]}{x^2}$

-2 simplify

3) Find the derivative $g(x) = 6x^2 + \frac{1}{e^{4x}} + \ln(7x^2+9) + e^2$ (15 points)

$g'(x) = 12x + e^{-4x} - \frac{14x}{7x^2+9} + 0e^2$

$g'(x) = 12x + -4e^{-4x} - \frac{14x}{7x^2+9}$

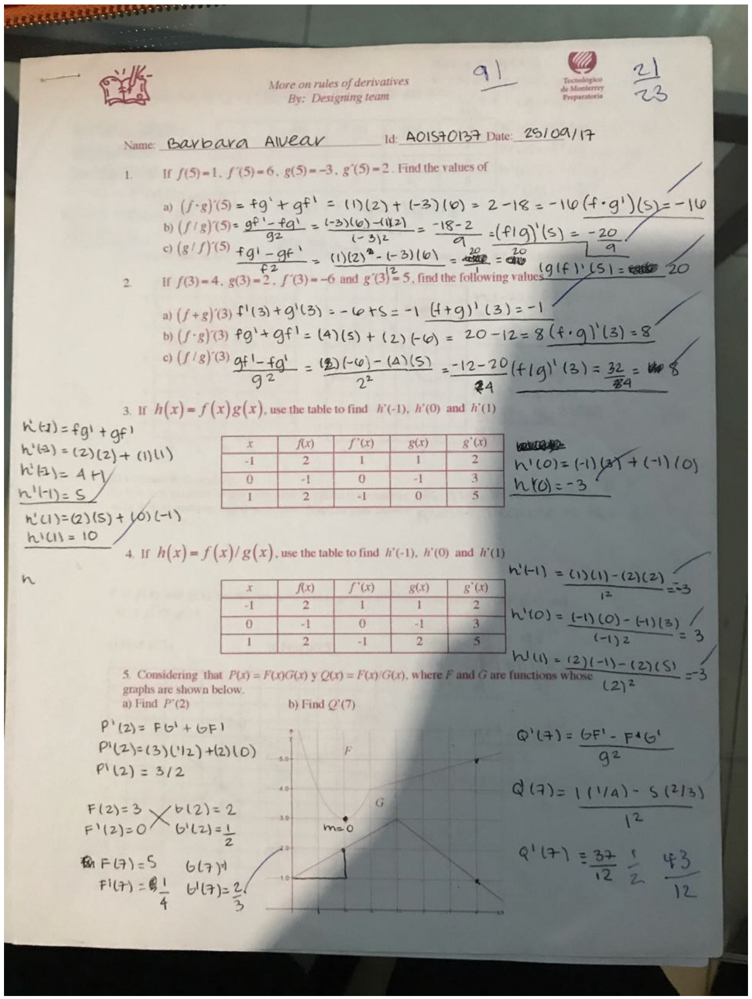
$g'(x) = 12x - \frac{4}{e^{4x}} - \frac{14x}{7x^2+9}$

wrong simplification?

-2

CLASSWORKS

More rules on derivatives (with out functions)



More on rules of derivatives
By: Designing team

Name: Barbara Alvear Id: A01570137 Date: 25/09/17

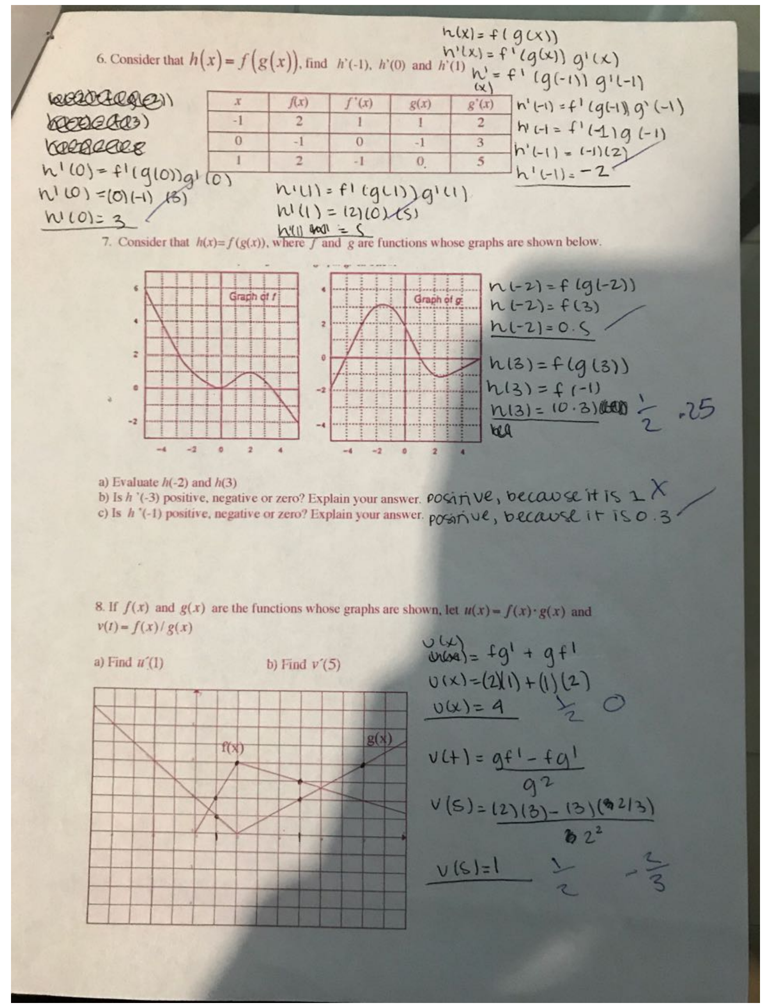
1. If $f(5)=1$, $f'(5)=6$, $g(5)=-3$, $g'(5)=2$. Find the values of
   a) $(f\cdot g)'(5)$
   b) $(f/g)'(5)$
   c) $(g/f)'(5)$
2. If $f(3)=4$, $g(3)=2$, $f'(3)=-6$ and $g'(3)=5$, find the following values
   a) $(f+g)'(3)$
   b) $(f\cdot g)'(3)$
   c) $(f/g)'(3)$
3. If $h(x)=f(x)g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

4. If $h(x)=f(x)/g(x)$, use the table to find $h'(-1)$, $h'(0)$ and $h'(1)$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	2	5

5. Considering that $P(x)=F(x)G(x)$ y $Q(x)=F(x)/G(x)$, where F and G are functions whose graphs are shown below.
   a) Find $P'(2)$ b) Find $Q'(7)$



6. Consider that $h(x)=f(g(x))$, find $h'(-1)$, $h'(0)$ and $h'(1)$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	1	1	2
0	-1	0	-1	3
1	2	-1	0	5

7. Consider that $h(x)=f(g(x))$, where f and g are functions whose graphs are shown below.

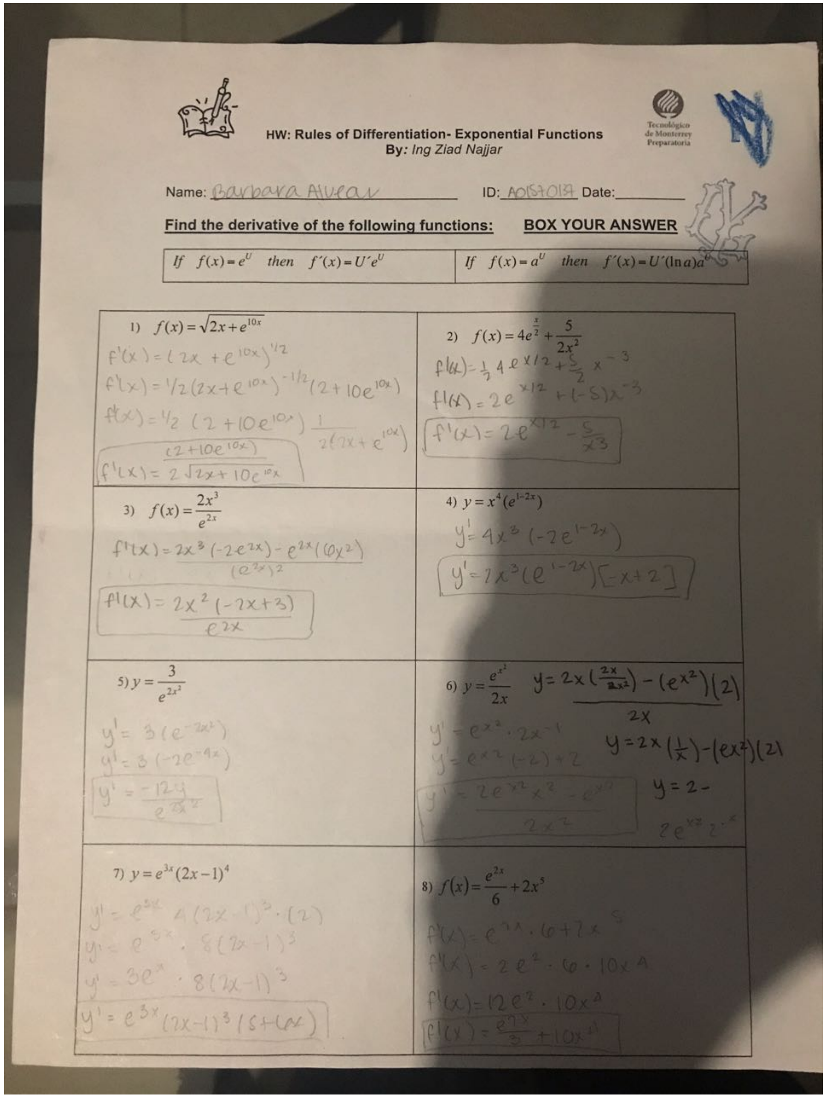
Graph of f

Graph of g

a) Evaluate $h(-2)$ and $h(3)$
b) Is $h'(-3)$ positive, negative or zero? Explain your answer.
c) Is $h'(-1)$ positive, negative or zero? Explain your answer.

8. If $f(x)$ and $g(x)$ are the functions whose graphs are shown, let $u(x)=f(x)\cdot g(x)$ and $v(t)=f(x)/g(x)$
   a) Find $u'(1)$ b) Find $v'(5)$

HW: Rules of Differentiation- Exponential Functions



HW: Rules of Differentiation- Exponential Functions
By: Ing Ziad Najjar

Tecnológico de Monterrey Preparatoria

Name: Barbara Alvear ID: A01570137 Date:

Find the derivative of the following functions: **BOX YOUR ANSWER**

If $f(x)=e^U$ then $f'(x)=U'e^U$	If $f(x)=a^U$ then $f'(x)=U'(\ln a)a^U$

1) $f(x)=\sqrt{2x+e^{10x}}$

2) $f(x)=4e^{\frac{x}{2}}+\frac{5}{2x^2}$

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

4) $y=x^4(e^{1-2x})$

5) $y=\frac{3}{e^{2x^2}}$

6) $y=\frac{e^{x^2}}{2x}$

7) $y=e^{3x}(2x-1)^4$

8) $f(x)=\frac{e^{2x}}{6}+2x^5$

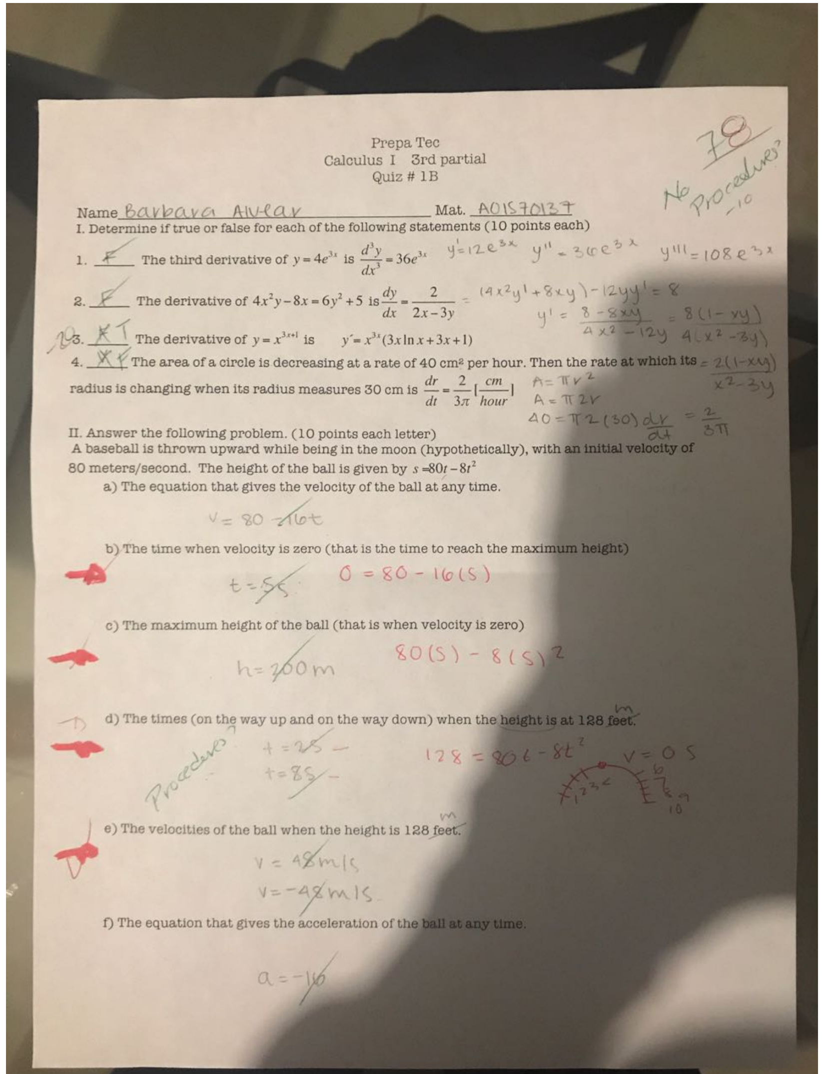
Partial Project

https://www.geogebra.org/m/ru7QjnYN

THIRD PARTIAL

QUIZZES

QUIZ 1



Prepa Tec
Calculus I 3rd partial
Quiz # 1B

Name Barbara Alvear Mat. A01570137

I. Determine if true or false for each of the following statements (10 points each)

1. ___F___ The third derivative of $y = 4e^{3x}$ is $\frac{d^3y}{dx^3} = 36e^{3x}$

2. ___F___ The derivative of $4x^2y - 8x = 6y^2 + 5$ is $\frac{dy}{dx} = \frac{2}{2x-3y}$

3. ___T___ The derivative of $y = x^{3x+1}$ is $y' = x^{3x}(3x \ln x + 3x + 1)$

4. ___F___ The area of a circle is decreasing at a rate of 40 cm² per hour. Then the rate at which its radius is changing when its radius measures 30 cm is $\frac{dr}{dt} = \frac{2}{3\pi}\left[\frac{cm}{hour}\right]$

II. Answer the following problem. (10 points each letter)

A baseball is thrown upward while being in the moon (hypothetically), with an initial velocity of 80 meters/second. The height of the ball is given by $s = 80t - 8t^2$

a) The equation that gives the velocity of the ball at any time.

b) The time when velocity is zero (that is the time to reach the maximum height)

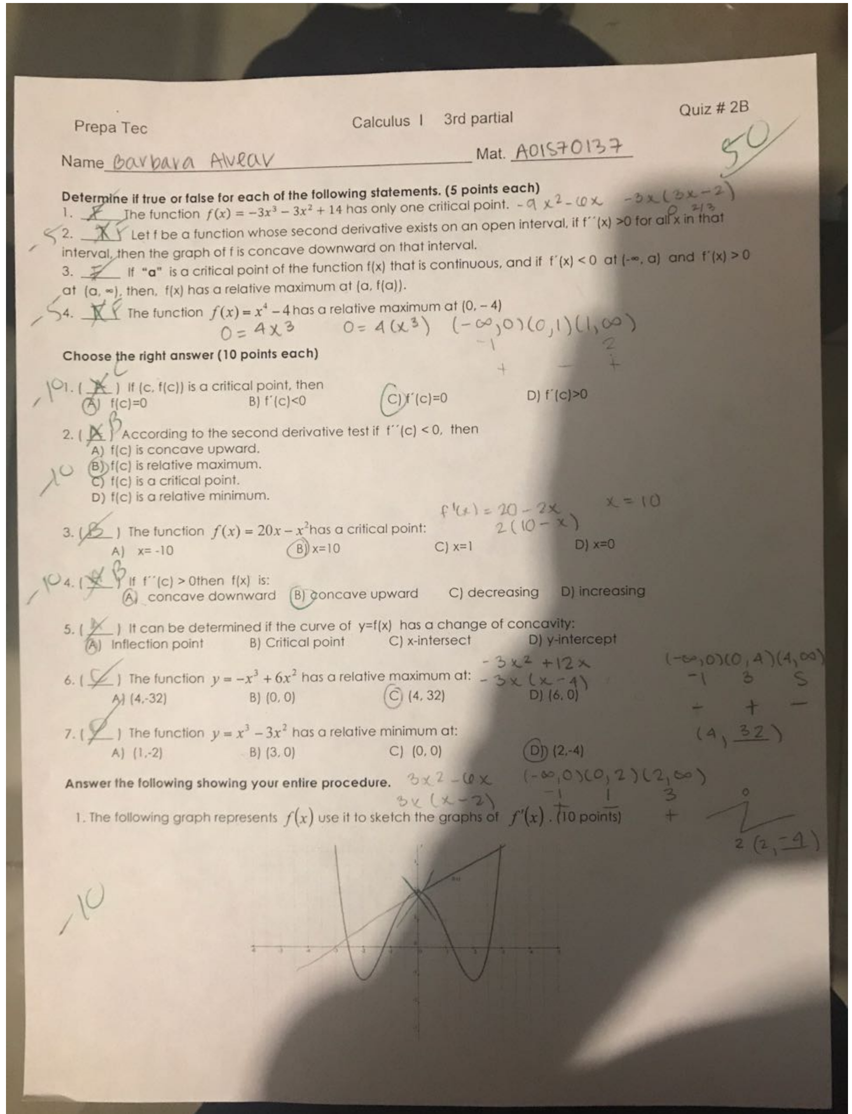
c) The maximum height of the ball (that is when velocity is zero)

d) The times (on the way up and on the way down) when the height is at 128 feet.

e) The velocities of the ball when the height is 128 feet.

f) The equation that gives the acceleration of the ball at any time.

QUIZ 2



Prepa Tec — Calculus I — 3rd partial — Quiz # 2B

Name Barbara Alvear — Mat. A01570137

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Determine if true or false for each of the following statements. (5 points each)

1. F The function $f(x)=-3x^3-3x^2+14$ has only one critical point.
2. F Let f be a function whose second derivative exists on an open interval, if f´´(x) >0 for all x in that interval, then the graph of f is concave downward on that interval.
3. F If "a" is a critical point of the function f(x) that is continuous, and if f´(x) < 0 at (-∞, a) and f´(x) > 0 at (a, ∞), then, f(x) has a relative maximum at (a, f(a)).
4. F The function $f(x)=x^4-4$ has a relative maximum at (0, – 4)

Choose the right answer (10 points each)

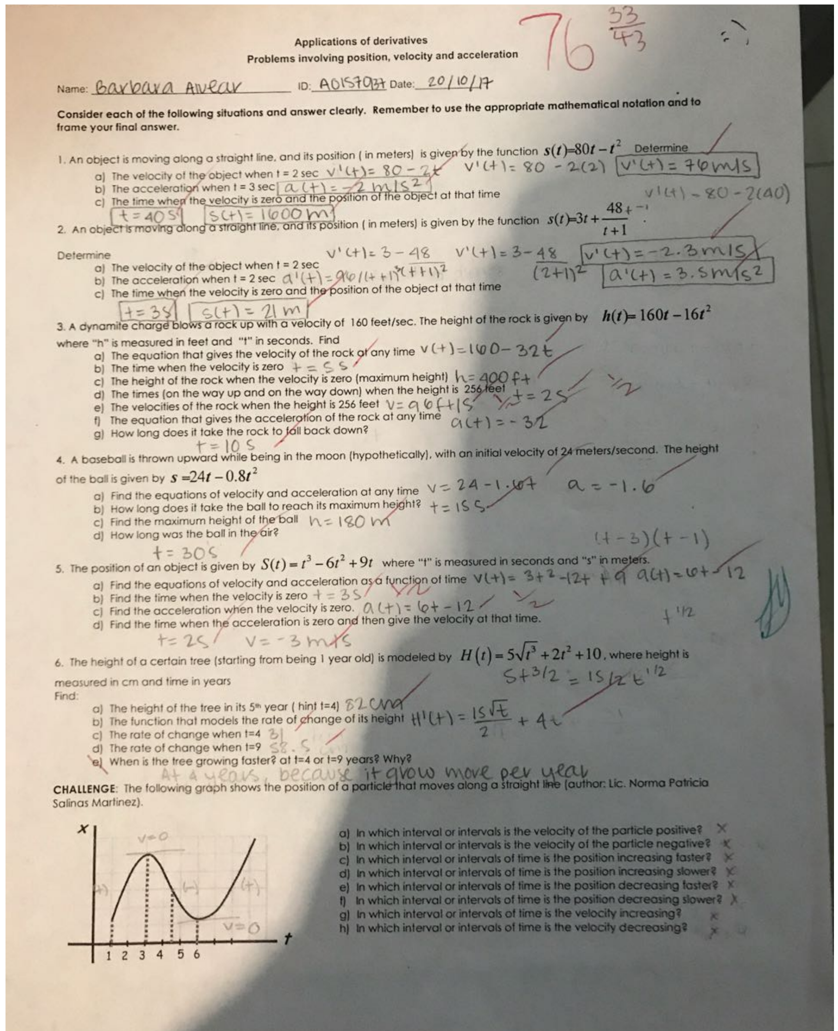
1. (C) If (c, f(c)) is a critical point, then
   A) f(c)=0 B) f´(c)<0 C) f´(c)=0 D) f´(c)>0
2. (B) According to the second derivative test if f´´(c) < 0, then
   A) f(c) is concave upward.
   B) f(c) is relative maximum.
   C) f(c) is a critical point.
   D) f(c) is a relative minimum.
3. (B) The function $f(x)=20x-x^2$ has a critical point:
   A) x= -10 B) x=10 C) x=1 D) x=0
4. (B) If f´´(c) > 0then f(x) is:
   A) concave downward B) concave upward C) decreasing D) increasing
5. (A) It can be determined if the curve of y=f(x) has a change of concavity:
   A) Inflection point B) Critical point C) x-intersect D) y-intercept
6. (C) The function $y=-x^3+6x^2$ has a relative maximum at:
   A) (4,-32) B) (0, 0) C) (4, 32) D) (6, 0)
7. (D) The function $y=x^3-3x^2$ has a relative minimum at:
   A) (1,-2) B) (3, 0) C) (0, 0) D) (2,-4)

Answer the following showing your entire procedure.

1. The following graph represents $f(x)$ use it to sketch the graphs of $f'(x)$. (10 points)

CLASSWORKS

Applications of derivatives:
Problems involving position, velocity and acceleration



Applications of derivatives

Problems involving position, velocity and acceleration

Name: Barbara Alvear ID: A0157937 Date: 20/10/17

Consider each of the following situations and answer clearly. Remember to use the appropriate mathematical notation and to frame your final answer.

1. An object is moving along a straight line, and its position (in meters) is given by the function $s(t)=80t-t^2$ Determine
   a) The velocity of the object when t = 2 sec
   b) The acceleration when t = 3 sec
   c) The time when the velocity is zero and the position of the object at that time

2. An object is moving along a straight line, and its position (in meters) is given by the function $s(t)=3t+\frac{48}{t+1}$.

Determine
   a) The velocity of the object when t = 2 sec
   b) The acceleration when t = 2 sec
   c) The time when the velocity is zero and the position of the object at that time

3. A dynamite charge blows a rock up with a velocity of 160 feet/sec. The height of the rock is given by $h(t)=160t-16t^2$ where "h" is measured in feet and "t" in seconds. Find
   a) The equation that gives the velocity of the rock at any time
   b) The time when the velocity is zero
   c) The height of the rock when the velocity is zero (maximum height)
   d) The times (on the way up and on the way down) when the height is 256 feet
   e) The velocities of the rock when the height is 256 feet
   f) The equation that gives the acceleration of the rock at any time
   g) How long does it take the rock to fall back down?

4. A baseball is thrown upward while being in the moon (hypothetically), with an initial velocity of 24 meters/second. The height of the ball is given by $s=24t-0.8t^2$
   a) Find the equations of velocity and acceleration at any time
   b) How long does it take the ball to reach its maximum height?
   c) Find the maximum height of the ball
   d) How long was the ball in the air?

5. The position of an object is given by $S(t)=t^3-6t^2+9t$ where "t" is measured in seconds and "s" in meters.
   a) Find the equations of velocity and acceleration as a function of time
   b) Find the time when the velocity is zero
   c) Find the acceleration when the velocity is zero.
   d) Find the time when the acceleration is zero and then give the velocity at that time.

6. The height of a certain tree (starting from being 1 year old) is modeled by $H(t)=5\sqrt{t^3}+2t^2+10$, where height is measured in cm and time in years

Find:
   a) The height of the tree in its 5th year (hint t=4)
   b) The function that models the rate of change of its height
   c) The rate of change when t=4
   d) The rate of change when t=9
   e) When is the tree growing faster? at t=4 or t=9 years? Why?

At 4 years, because it grow more per year

CHALLENGE: The following graph shows the position of a particle that moves along a straight line (author: Lic. Norma Patricia Salinas Martinez).

a) In which interval or intervals is the velocity of the particle positive?
b) In which interval or intervals is the velocity of the particle negative?
c) In which interval or intervals of time is the position increasing faster?
d) In which interval or intervals of time is the position increasing slower?
e) In which interval or intervals of time is the position decreasing faster?
f) In which interval or intervals of time is the position decreasing slower?
g) In which interval or intervals of time is the velocity increasing?
h) In which interval or intervals of time is the velocity decreasing?

Related rates

Related Rates

By: Arq. Monica M. Paniagua, Ing. Ziad Najjar, Lic. Lucy Solis, Lic Carmela de la fuente

Tecnológico de Monterrey Preparatoria

By: Arq.

Name Barbara Awear ID # A01570137 Date 27/10/17

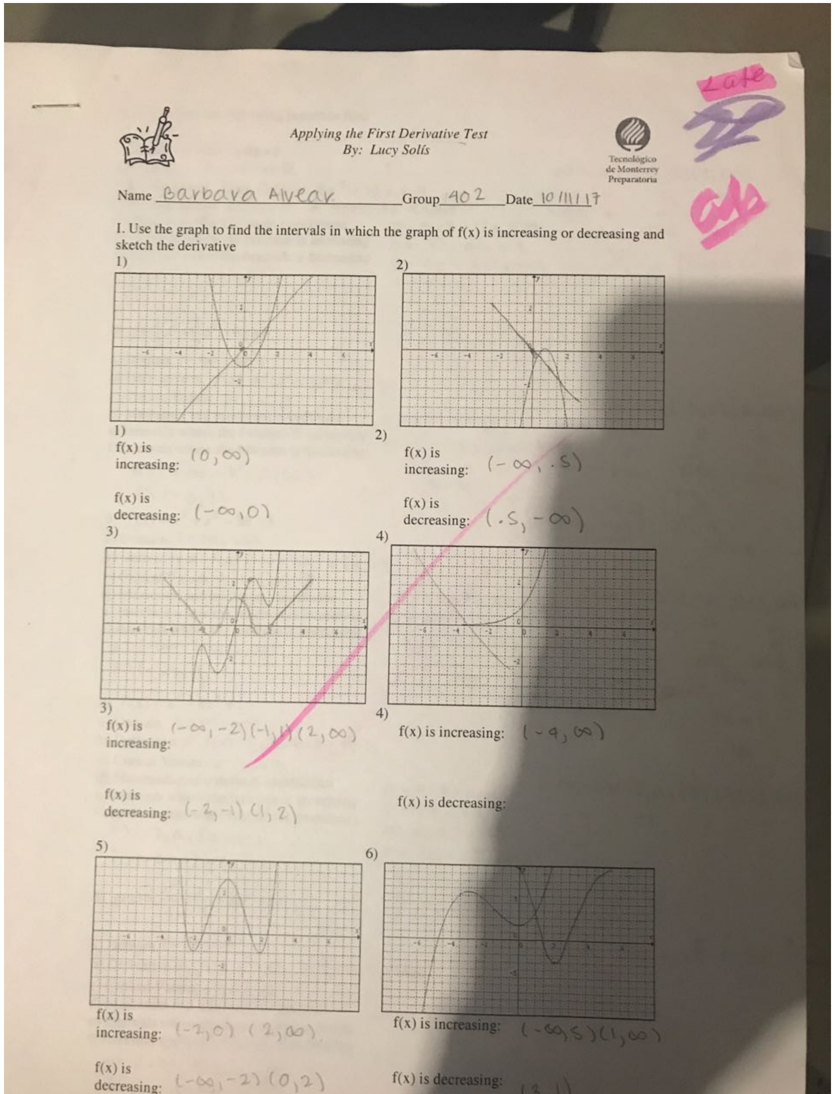
Related rates

1. A spherical balloon is being filled at a rate of $50in^3/sec$, at what rate does the radius increase when the radius is 5in?
2. The area of a circle is increasing at a rate of $20in^2/min$. Find the rate at which the radius is increasing when the radius is 4in.
3. A stone is thrown into a lake and a circular ripple moves out at a constant rate of 0.5 meters/sec. Find the rate at which the circle's area is increasing at r = 0.4 meters.
4. Air is being pumped into a spherical balloon making the radius change at a constant rate of 0.5cm/sec. Find the rate of change of the volume and the rate of change of the surface area when the radius is 10cm ($V = \frac{4}{3}\pi r^3$, $A = 4\pi r^2$)
5. A cone is increasing in size as time goes by in such a way that the volume is changing at a constant rate of $75cm^3/min$. The height is twice the radius. Determine the rate of change of the height, when the height is 5cm. ($V = \frac{1}{3}\pi r^2 h$)
6. A farmer has a water reservoir that has the shape of a cylinder of 5ft in diameter and 14 ft in height. Water is pumped from it at a constant rate of $0.25ft^3/min$. Find the rate at which the water level is lowering, when the water already has a level of 10ft.
7. A cube is increasing its size at a rate of 3 cm/min. Determine the rate of change of the volume and the rate of change of the surface area when the edge measures 6 cm.
8. A spherical balloon is being filled with air in such a way that the radius is increasing at a constant rate of change 0.2cm/sec. Find the rate of change of the volume when the radius is 12cm
9. A cone is increasing in such a manner that its height is always three times its radius. Find the rate at which the radius is changing, at the moment when radius measures 6 cm, knowing that its volume is incrementing at a rate of 60 cm^3 per minutes (Hint: $V = \frac{1}{3}\pi r^2 h$)
10. A triangle is increasing in such a way that its height is always half of its base. Find the rate at which the area is changing, when the base measures 12 cm, if the base is incrementing at a rate of 3 cm per minute.

ANSWERS

1. $\frac{1}{2\pi} \approx 0.159\ in/sec$ 2. $\frac{5}{2\pi} \approx 0.796\ in/min$ 3. $0.4\pi \approx 1.257\ m^2/sec$
4. $\frac{dV}{dt} = 200\pi \approx 628.32\ cm^3/sec$, $\frac{dA}{dt} = 40\pi \approx 125.66\ cm^2/sec$ 5. $\frac{12}{\pi} \approx 3.82\ cm/min$
6. $-\frac{1}{25\pi} \approx -0.013\ ft/min$ 7. $\frac{dV}{dt} = 324\ cm^3/min$, $\frac{dA}{dt} = 216\ cm^2/min$
8. $115.2\pi \approx 361.9\ cm^3/sec$ 9. $\frac{dr}{dt} = \frac{5}{9\pi}[\frac{cm}{min}] \approx 0.177[\frac{cm}{min}]$ 10. $\frac{dA}{dt} = 18[\frac{cm^2}{min}]$

Applying the First derivative Test


Applying the First Derivative Test
By: Lucy Solís

Tecnológico de Monterrey Preparatoria

Name Barbara Alvear Group 402 Date 10/11/17

I. Use the graph to find the intervals in which the graph of f(x) is increasing or decreasing and sketch the derivative

1) f(x) is increasing: (0, ∞)
f(x) is decreasing: (−∞, 0)

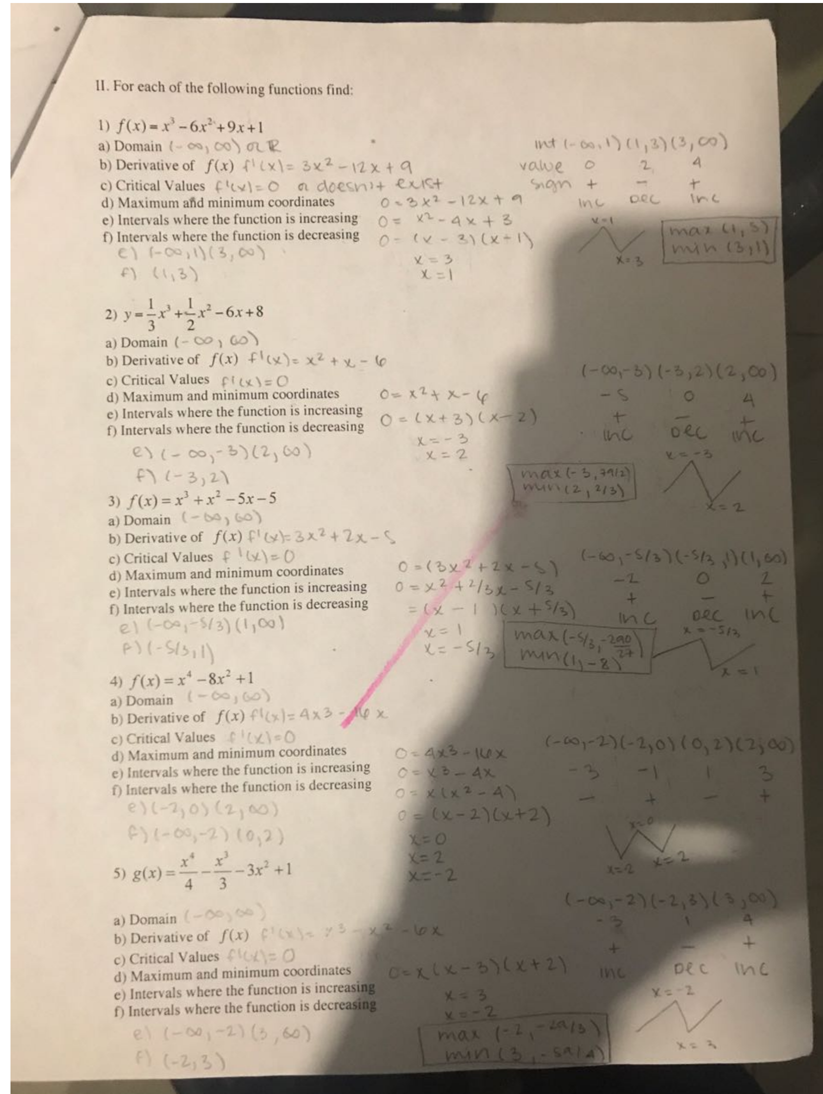
2) f(x) is increasing: (−∞, .5)
f(x) is decreasing: (.5, −∞)

3) f(x) is increasing: (−∞, −2) (−1, 1) (2, ∞)
f(x) is decreasing: (−2, −1) (1, 2)

4) f(x) is increasing: (−4, ∞)
f(x) is decreasing:

5) f(x) is increasing: (−2, 0) (2, ∞)
f(x) is decreasing: (−∞, −2) (0, 2)

6) f(x) is increasing: (−∞, .5) (1, ∞)
f(x) is decreasing: (.5, 1)


II. For each of the following functions find:

1) $f(x) = x^3 - 6x^2 + 9x + 1$
a) Domain (−∞, ∞) or ℝ
b) Derivative of $f(x)$ $f'(x) = 3x^2 - 12x + 9$
c) Critical Values $f'(x) = 0$ or doesn't exist
d) Maximum and minimum coordinates
e) Intervals where the function is increasing
f) Intervals where the function is decreasing
$0 = 3x^2 - 12x + 9$; $0 = x^2 - 4x + 3$; $0 = (x-3)(x+1)$; x = 3, x = 1
e) (−∞, 1) (3, ∞)
f) (1, 3)
max (1, 5) min (3, 1)

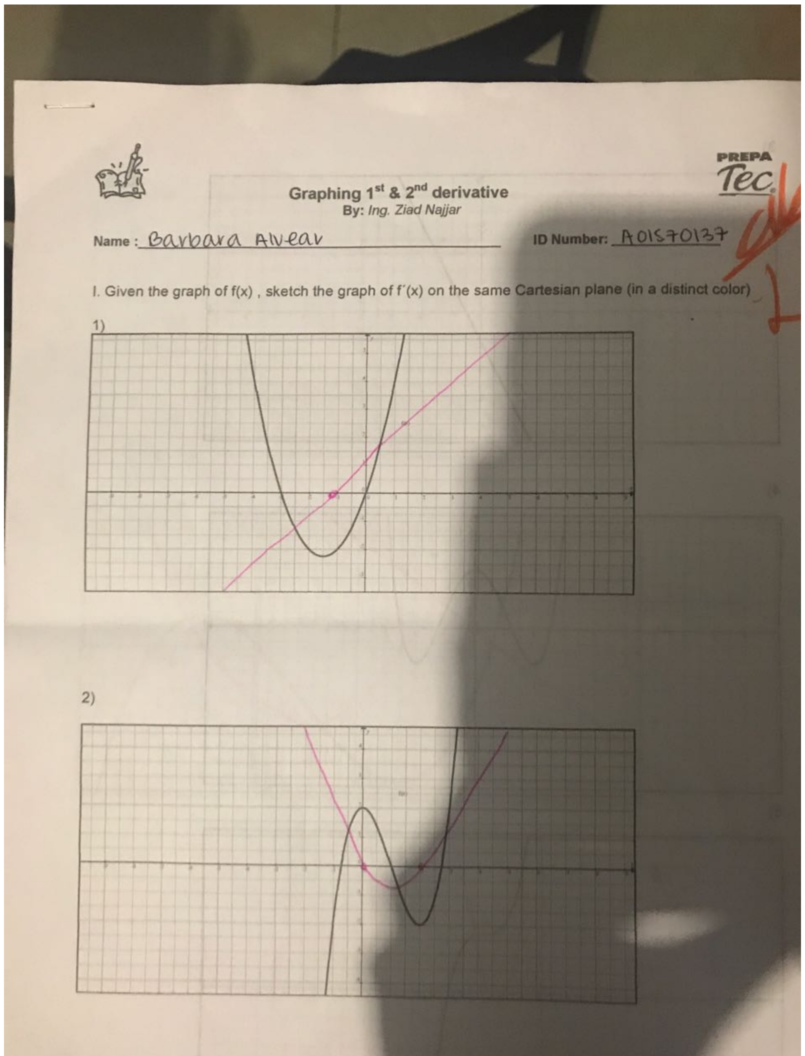
2) $y = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x + 8$
a) Domain (−∞, ∞)
b) Derivative of $f(x)$ $f'(x) = x^2 + x - 6$
c) Critical Values $f'(x) = 0$
d) Maximum and minimum coordinates
e) Intervals where the function is increasing
f) Intervals where the function is decreasing
$0 = x^2 + x - 6$; $0 = (x+3)(x-2)$; x = −3, x = 2
e) (−∞, −3) (2, ∞)
f) (−3, 2)
max (−3, 37/2) min (2, 2/3)

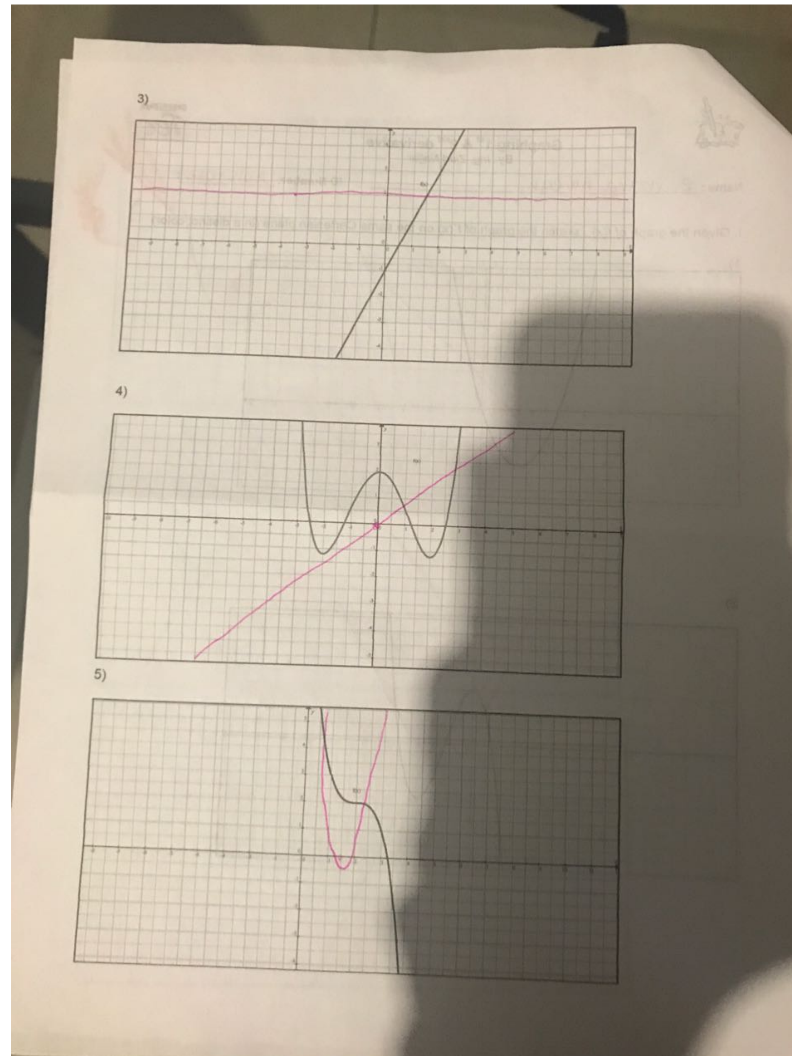
3) $f(x) = x^3 + x^2 - 5x - 5$
a) Domain (−∞, ∞)
b) Derivative of $f(x)$ $f'(x) = 3x^2 + 2x - 5$
c) Critical Values $f'(x) = 0$
d) Maximum and minimum coordinates
e) Intervals where the function is increasing
f) Intervals where the function is decreasing
e) (−∞, −5/3) (1, ∞)
f) (−5/3, 1)
x = 1, x = −5/3
max (−5/3, −[illegible]/27) min (1, −8)

4) $f(x) = x^4 - 8x^2 + 1$
a) Domain (−∞, ∞)
b) Derivative of $f(x)$ $f'(x) = 4x^3 - 16x$
c) Critical Values $f'(x) = 0$
d) Maximum and minimum coordinates
e) Intervals where the function is increasing
f) Intervals where the function is decreasing
e) (−2, 0) (2, ∞)
f) (−∞, −2) (0, 2)
x = 0, x = 2, x = −2

5) $g(x) = \frac{x^4}{4} - \frac{x^3}{3} - 3x^2 + 1$
a) Domain (−∞, ∞)
b) Derivative of $f(x)$ $f'(x) = x^3 - x^2 - 6x$
c) Critical Values $f'(x) = 0$
d) Maximum and minimum coordinates
e) Intervals where the function is increasing
f) Intervals where the function is decreasing
$0 = x(x-3)(x+2)$; x = 3, x = −2
e) (−∞, −2) (3, ∞)
f) (−2, 3)
max (−2, −29/3) min (3, −59/4)

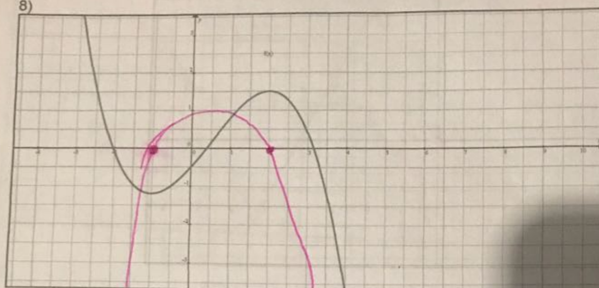
Graphing 1st & 2nd derivative



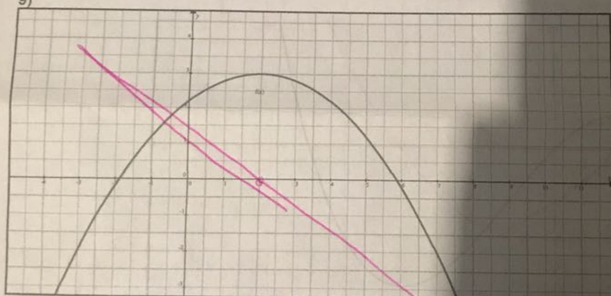


II. Given the graph of $f(x)$, sketch the graph of $f'(x)$ and $f''(x)$ on the same Cartesian plane (in two distinct colors)

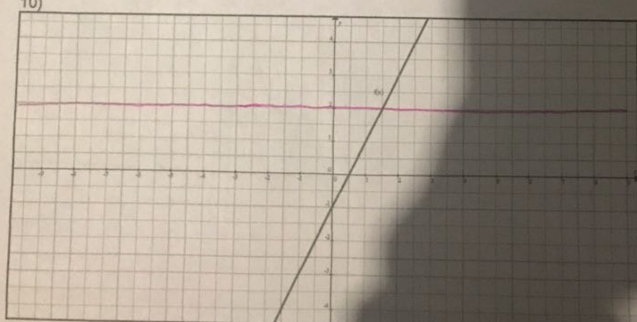
8)



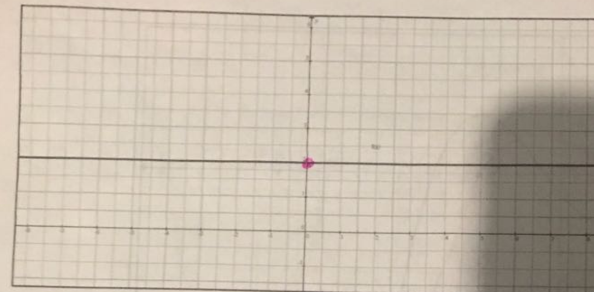
9)



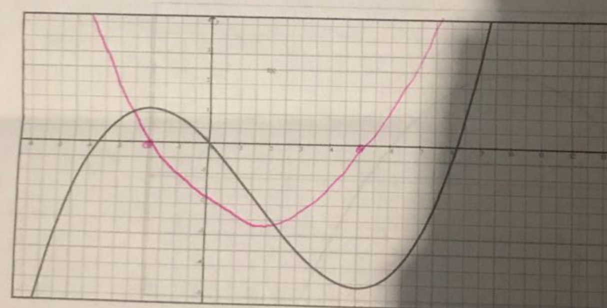
10)



6)



7)



ACTIVITY: VALOR DE LA DIVERSIDAD

https://www.geogebra.org/m/eDwdfAfq