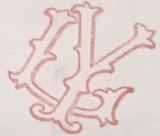


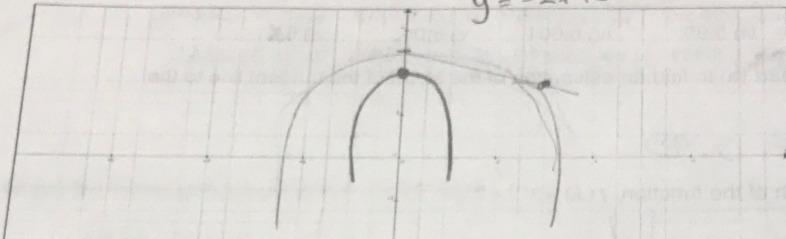


**Slope of Tangent Line Using Secant Line and Concept of Limits**  
By: Designing Team



Name daniela ramírez Group 401 Date \_\_\_\_\_

1. a) Sketch the graph of the function  $f(x) = -x^2 + 4$   
 $y = -2x + 5$



Find the slope of the secant line passing through the points P(1,3) and Q (given below)

- b) Write the slopes in the following table:

$m = \frac{4-3}{0-1}$   
 $m = \frac{3.75-3}{0.5-1}$   
 $m = \frac{3.19-3}{0.95-1}$

$Q(x, -x^2 + 4)$	$m$
(0, 4)	-1
(0.5, 3.75)	-1.5
(0.9, 3.19)	-1.9
(0.95, 3.0975)	-1.95
(0.99, 3.0199)	-1.99
(0.999, 3.001999)	-1.999

$Q(x, -x^2 + 4)$	$m$
(2, 0)	-3
(1.5, 1.75)	-2.5
(1.1, 2.79)	-2.1
(1.05, 2.8975)	-2.05
(1.01, 2.9799)	-2.01
(1.001, 2.997999)	-2.001

$\frac{-1-3}{2-1}$   
 $\frac{1.75-3}{1.5-1}$

same {

- c) Which value is being approximated by the secant line when the point Q approaches the point P(1,3)?  $-2$

- d) Based on the previous information find the slope of the tangent line passing through (1, 3)  $-2$

- e) Find the equation of the tangent line at the point (1, 3)

$y = mx + b$   
 $y - y_1 = m(x - x_1)$

$y - 3 = -2(x - 1)$   
 $y = -2x + 2 + 3$

$y = -2x + 5$

equation of the tangent line

2. The point (2,1) lies on the curve  $f(x) = \frac{1}{x-1}$

- a) If Q is the point  $(x, \frac{1}{x-1})$ , find the slope of the secant line PQ (round to six decimals) for the following values of x:

i) 1.5

ii) 1.75

iii) 1.9

iv) 1.99

v) 1.999

$y = 2$

$y = 1.33$

$y = 1.11$

$y = 1.0101$

$y = 1.001$

$\frac{1-1}{1.5-2}$   
 $m = -2$

$\frac{1.3-1}{1.75-2}$   
 $m = -1.33$

$\frac{1.1-1}{1.9-2}$   
 $m = -1.1$

$\frac{1.0101-1}{1.99-2}$   
 $m = -1.01$

$\frac{1.001-1}{1.999-2}$   
 $m = -1.001$

$m = -2$

$m = -1.33$

$m = -1.1$

$m = -1.01$

$m = -1.001$



b) Use the results of part (a) to find an estimation of the slope of the tangent line to the curve at (2,1)

$$m \approx -1$$

3. The point (6,2) lies on the curve  $f(x) = \sqrt{x-2}$ .

a) If Q is the point  $(x, \sqrt{x-2})$ , find the slope of the secant line PQ (round to six decimals)

for the following values of x:

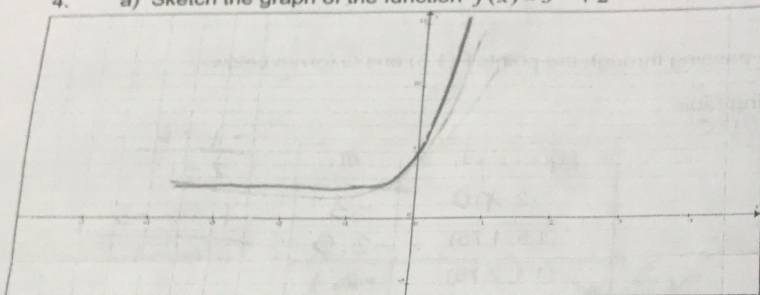
$m = 0.258344$   $m = 0.25159$   $m = 0.25020$   $m = 0.2490$   $m = 0.2498$   $m = 0.24845$   
 i) 5.5 ii) 5.9 iii) 5.99 iv) 6.001 v) 6.01 vi) 6.1

$y = 1.870823$   $y = 1.97491$   $y = 1.991499$   $y = 2.000249$   $y = 2.002498$   $y = 2.024845$

b) Use the results of part (a) to find an estimation of the slope of the tangent line to the curve at (6,2)

$$m \approx 0.25$$

4. a) Sketch the graph of the function  $f(x) = 3^{x+1} + 2$



b) Find the slope of the secant line passing through the points P(0,5) and Q (given below)

a) Write the slopes in the following table:

Q(x, 3 <sup>x+1</sup> + 2)	m
(0, 5)	—
(0.5, 7.196)	4.392
(0.25, 5.948)	3.792
(0.15, 5.537)	3.58
(0.1, 5.348)	3.48
(0.01, 5.033)	3.3

Q(x, 3 <sup>x+1</sup> + 2)	m
(-0.5, 3.732)	2.536
(-0.25, 4.280)	2.88
(-0.15, 4.544)	3.04
(-0.1, 4.688)	3.12
(-0.01, 4.997)	3.278

b) Which value is being approximated by the secant lines when the point Q approaches the point P(0,5)?

$$\approx 3.3$$

c) Based on the previous information find the slope of the tangent line passing through (0,5)

$$m \approx 3.3$$

d) Find the equation of the tangent line at the point (0, 5)

$$y = mx + b$$

$$y - 5 = 3.3(x - 0)$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 3.3x$$

$$y = 3.3x + 5$$

$$\frac{y_2 - 5}{x_2 - 0}$$