4) Verify your answers from question #3 by calculating the LIMIT of the secant slopes as you approach $x = 2$.

a)

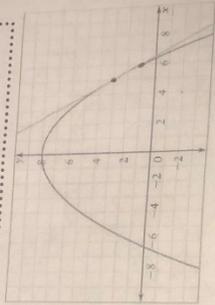| Interval	Δy	Δx	Slope of secant $= \frac{\Delta y}{\Delta x}$
$2 \le x \le 2.5$	4.25	0.5	8.5
$2 \le x \le 2.1$	0.73	0.1	7.3
$2 \le x \le 2.01$	0.0703	0.01	7.03
$2 \le x \le 2.001$	.007003	0.001	7.03

b)

Interval	Δy	Δx	Slope of secant $= \frac{\Delta y}{\Delta x}$
$2 \le x \le 2.5$	0.12132	0.5	.24264
$2 \le x \le 2.1$	0.024846	0.1	.24846
$2 \le x \le 2.01$	.002498	.01	.24984
$2 \le x \le 2.001$	.00025	.001	.24998

1) Consider the graph shown.

a) State the coordinates of the tangent point

(5, 3)

b) State the coordinates of another point on the tangent line

(6, 1)

c) Use the points you found to find the slope of the tangent line

$M = \dfrac{y_1 - y_2}{x_1 - x_1} = \dfrac{3-1}{6-5} \quad \dfrac{2}{1} = 2$

d) What does the slope of the tangent line represent?

tangent lines represent the
Instantaneous rate of change

2)a) At each of the indicated points on the graph, is the instantaneous rate of change positive, negative, or zero?

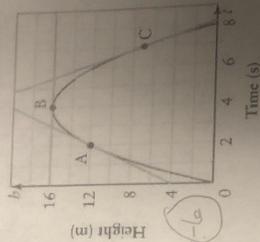Point A Its Positive
Point B Its Zero
Point C Its Negative

Height of a Tennis Ball

b) Estimate the instantaneous rate of change at points A and C.

$y = x(x-9)$ $H = 0$ $\dfrac{F(a+h)-F(a)}{h} =$

$\dfrac{2.3}{2-2} \quad \substack{5-1 \\ 5=1}$ $h = -t+9t$

$= -2+h$

at $(H+2)\dfrac{F(4)}{-2(7)+9} = -14+9 = -14+9 = \boxed{-6}$

c) Interpret the values in part b) for the situation represented by the graph

$\left(\substack{m = A; = \dfrac{16-8}{3-1} = \dfrac{8}{2} = 4 \quad A \\ \\ \dfrac{12-t}{6-8} = \dfrac{12}{-2} = -6 \quad \boxed{13}}\right)$
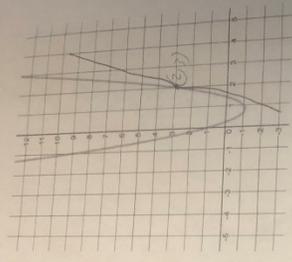
3) Use the graph of each function to estimate the instantaneous rate of change at $x = 2$ by drawing a tangent line and calculating it's slope.

a) $3x^2 - 5x + 1$

$6x - 5$

$a + x = 2 \rightarrow y = 3(4) - 5(2) + 1 = 3$

$6(2) - 5 = 7$

$\frac{y - 1}{x - 2} = 7$ tangent at $x = 2$

$y - 3 = 7x + 14$

$7x - 4 = 11 = 5$ slope $(2,1) = 7$

b) $\sqrt{x+2}$

$y = a + \frac{1}{2}b$

$= \frac{-1}{2}(x + 2)^{1/2}$

$= 2 = 7 \quad y = a + \frac{1}{2}y^{1/2} = 2$

$= \frac{-1}{2} \quad (2+2)^{-1/2} = \frac{1}{4}$

$\frac{y - 2}{x - 2} = \frac{1}{4} \quad \frac{x - 2 = 4}{x - 4y + 2 = 0}$

slope $= \frac{1}{4}$