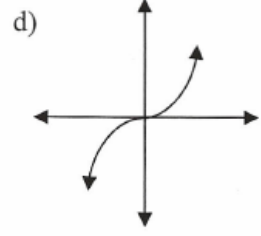
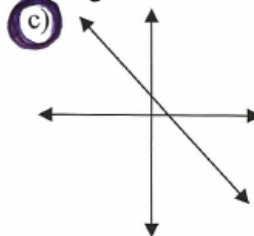
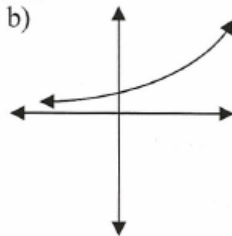
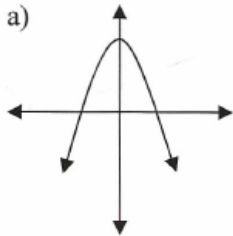


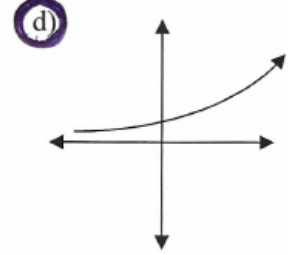
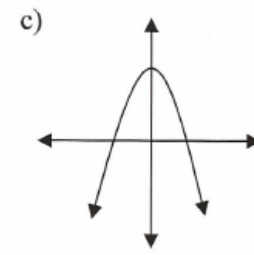
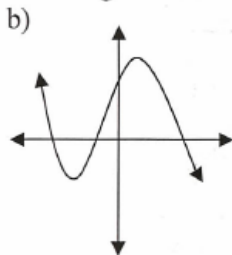
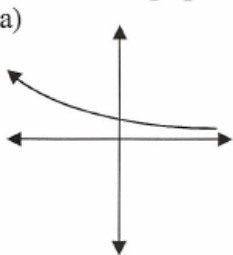
**Math 11**

**Rate of Change – Review #1**

1. Which of the following graphs has a **constant** rate of change?

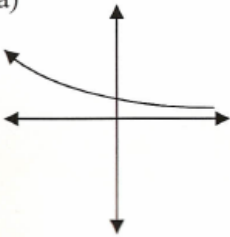


2. In which graph is the rate of change **increasing**?

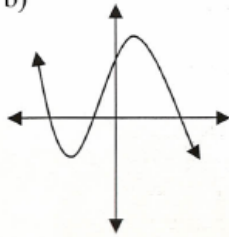


2. In which graph is the rate of change **increasing**?

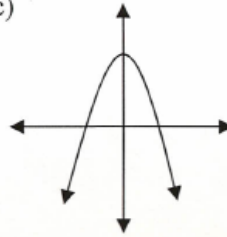
a)



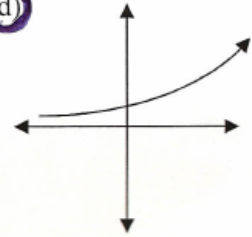
b)



c)



**d)**



3. The scores on tests from January until June:

a) Increased

**b) Decreased**

c) Remained Constant d) Do not have enough info.

S  
C  
O  
R  
E  
S

100  
90  
80  
70  
60  
50



Jan Feb Mar Apr May June

**MONTHS**

(10, 50)  
(50, 250)

$$\begin{aligned} \text{AROC} &= \frac{250 - 50}{50 - 10} \\ \text{AROC} &= \frac{200}{40} \\ \text{AROC} &= 5 \text{ m/s} \end{aligned}$$

4.

Seconds after start of race	0	10	20	30	40	50
Distance travelled (m)	0	50	80	120	180	250

The average rate of change from 10 seconds to 50 seconds was:

**a) 5 m/s**

b) 10 m/s

c)  $\frac{1}{5}$  m/s

d) 40 m/s

5.

Hours	Pay
0	0
1	12
2	28
3	44
4	57

The average rate of change from 1 hour to 4 hours is:

a) \$45/h

b) \$3/h

c) \$57/h

d) \$15/h

$(1, 12)$   $(4, 57)$   

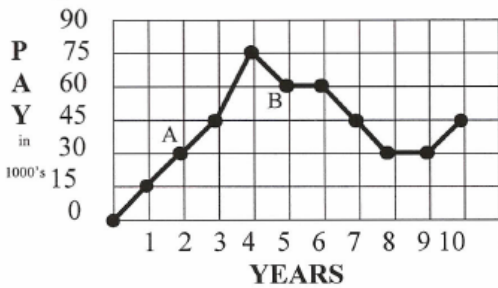
$$\text{AROC} = \frac{57 - 12}{4 - 1}$$

$$= \frac{45}{3}$$

$$= \$15/h$$

6.

SALARY



The average rate of change from interval A to B is:

a) \$10 000/year

b) -\$15 000/year

c) \$60 000/year

d) \$30 000/year

$A(2, 30)$   
 $B(5, 60)$

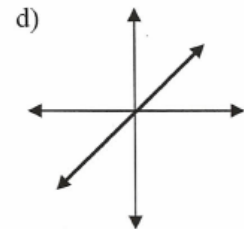
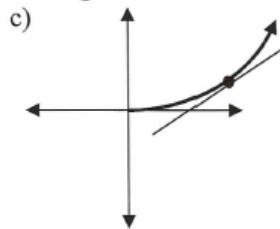
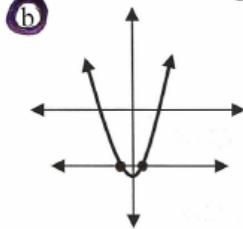
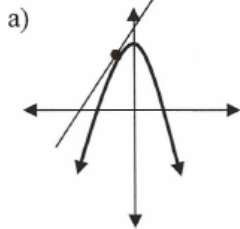
$$\text{AROC} = \frac{60 - 30}{5 - 2}$$

$$= \frac{30}{3}$$

$$= 10$$

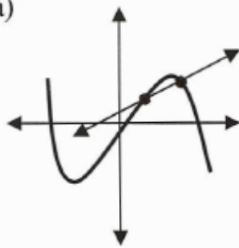
$$\Rightarrow \$10000/\text{year}$$

7. Which of the following graphs describes average rate of change?

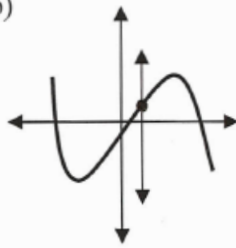


8. Which of the following graphs describes instantaneous rate of change?

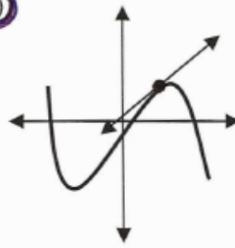
a)



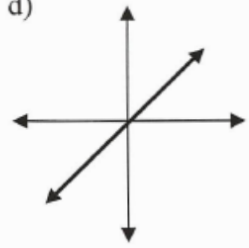
b)



c)



d)



9. The rate of change at a maximum or a minimum value is always:

a) Negative

b) Zero

c) Positive

d) Imaginary

$$10. h = -2(t-3)^2 + 4$$

A) Find the average rate of change from  $t = 1$  to  $t = 5$ .

$$\begin{aligned} t &= 1 \\ h &= -2(1-3)^2 + 4 \\ &= -2(-2)^2 + 4 \\ &= -2(4) + 4 \\ &= -8 + 4 \\ &= -4 \\ &(1, -4) \end{aligned}$$

$$\begin{aligned} t &= 5 \\ h &= -2(5-3)^2 + 4 \\ &= -2(2)^2 + 4 \\ &= -2(4) + 4 \\ &= -8 + 4 \\ &= -4 \\ &(5, -4) \end{aligned}$$

$$\begin{aligned} \text{AROC} &= \frac{-4 - (-4)}{5 - 1} \\ &= \frac{0}{4} \\ &= 0 \text{ m/s} \end{aligned}$$

B) Find the instantaneous rate of change at  $t = 2$ .

$$\begin{aligned} t &= 1.9 \\ h &= -2(1.9-3)^2 + 4 \\ &= -2(-1.1)^2 + 4 \\ &= -2(1.21) + 4 \\ &= -2.42 + 4 \\ &= 1.58 \\ &(1.9, 1.58) \end{aligned}$$

$$\begin{aligned} t &= 2.1 \\ h &= -2(2.1-3)^2 + 4 \\ &= -2(-0.9)^2 + 4 \\ &= -2(0.81) + 4 \\ &= -1.62 + 4 \\ &= 2.38 \\ &(2.1, 2.38) \end{aligned}$$

$$\begin{aligned} \text{IROC} &= \frac{2.38 - 1.58}{2.1 - 1.9} \\ &= \frac{0.8}{0.2} \\ &= 4 \text{ m/s} \end{aligned}$$

11. The following chart shows the change in temperature of a freezer when it is turned on.

Hour	Temperature, $D_1$	$D_2$
1	11	-5
2	6	-11
3	-5	-17
4	-22	-23
5	-45	

A) Find the average rate of change from 2 to 5 hours.

$$\begin{aligned} & (2, 6) \quad \text{AROC} = \frac{-45 - 6}{5 - 2} \\ & (5, -45) \quad = \frac{-51}{3} \\ & = -17 \text{ degrees per hour.} \end{aligned}$$

\* Constant on  $D_2$

B) Use the table to determine the equation that best models the data.

$$y = -3x^2 + 4x + 10$$

\* Remember, you need to determine the type of equation first

QUADRATIC!

12.  $h = -4.9t^2 + 19.2t + 400$

At what time is the instantaneous rate of change equal to zero?

\* Vertex

$$h - 400 = -4.9t^2 + 19.2t$$

$$h - 400 = -4.9(t^2 - 3.92t)$$

$$h - 400 - 18.8 = -4.9(t^2 - 3.92t + 3.84)$$

$$h - 418.8 = -4.9(t - 1.96)^2$$

$$h = -4.9(t - 1.96)^2 + 418.8$$

VERTEX (1.96, 418.8)

Therefore, the instantaneous rate of change will be zero at approximately 2 seconds.