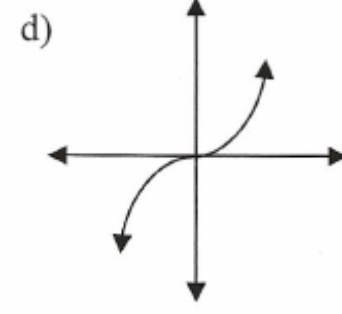
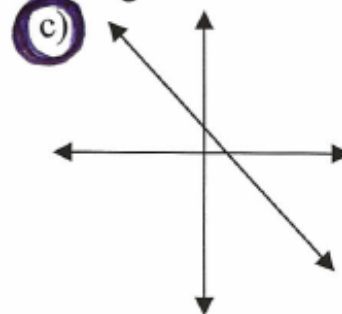
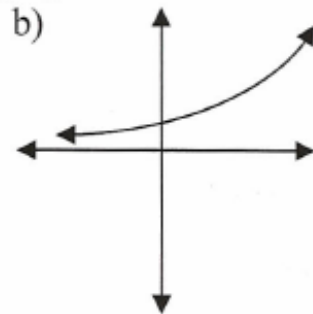
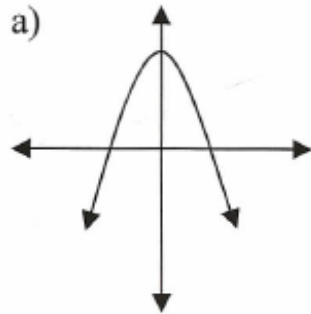


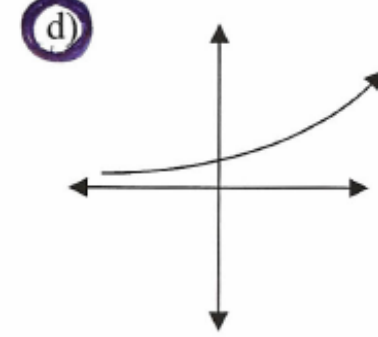
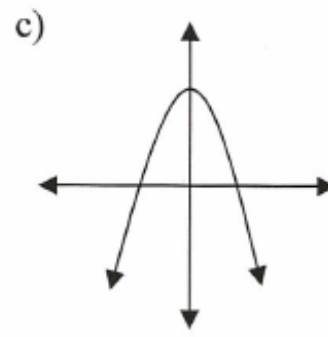
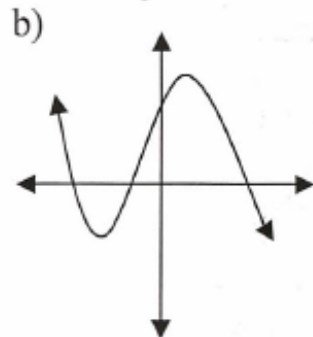
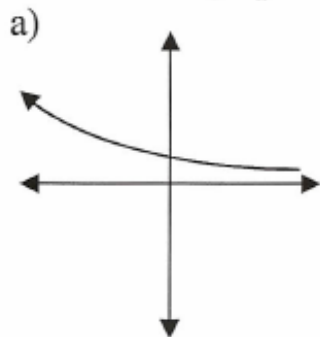
**Math 11**

**Rate of Change – Review #1**

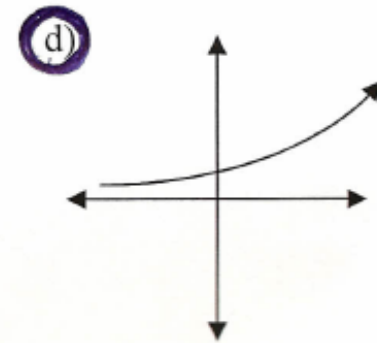
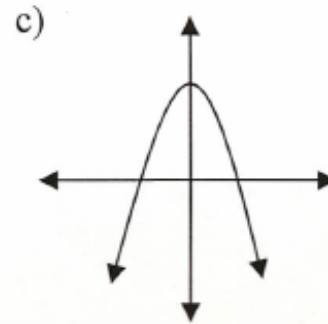
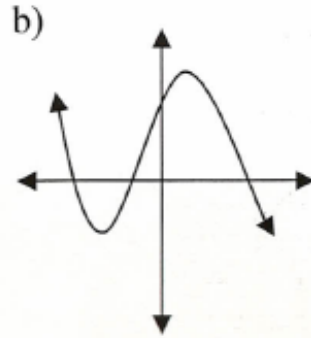
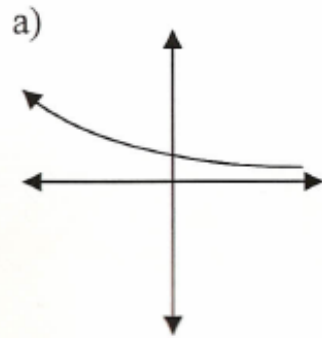
1. Which of the following graphs has a **constant** rate of change?



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

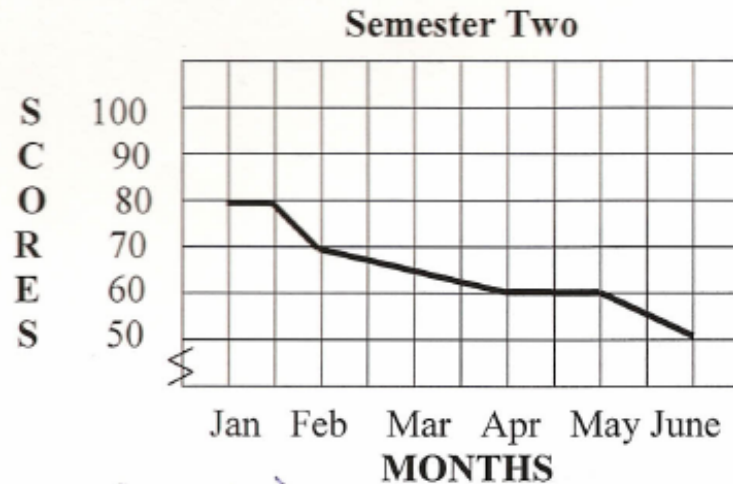


2. In which graph is the rate of change **increasing**?



3. The scores on tests from January until June:

- a) Increased      **b) Decreased**  
 c) Remained Constant    d) Do not have enough info.



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

$(10, 50)$   
 $(50, 250)$   
 $AROC = \frac{250 - 50}{50 - 10}$   
 $AROC = \frac{200}{40}$   
 $AROC = 5 \text{ m/s}$

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

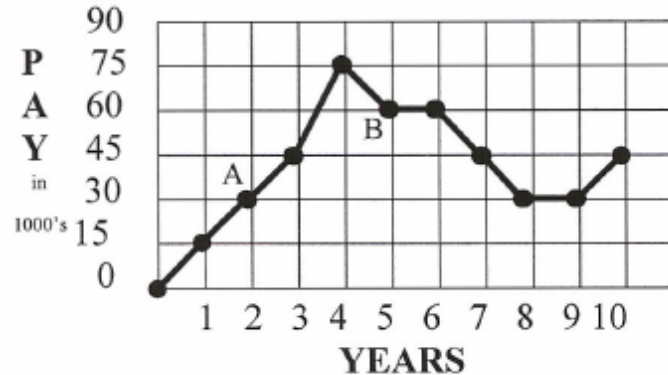
d) \$15/h

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

$$\begin{aligned} \text{AROC} &= \frac{57 - 12}{4 - 1} \\ &= \frac{45}{3} \\ &= \$15/\text{h} \end{aligned}$$

6.

**SALARY**



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

a) \$10 000/year

b) -\$15 000/year

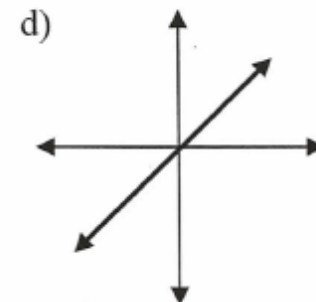
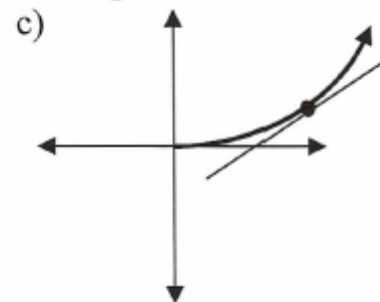
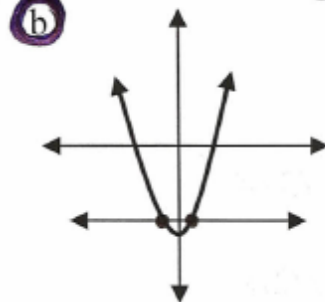
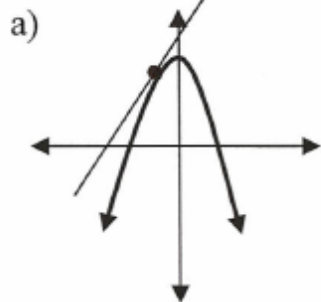
c) \$60 000/year

d) \$30 000/year

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

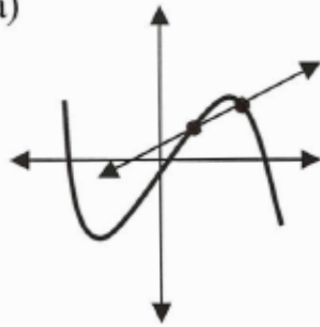
$$\begin{aligned} \text{AROC} &= \frac{60 - 30}{5 - 2} \\ &= \frac{30}{3} \\ &= 10 \\ &\Rightarrow \$10000/\text{year} \end{aligned}$$

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

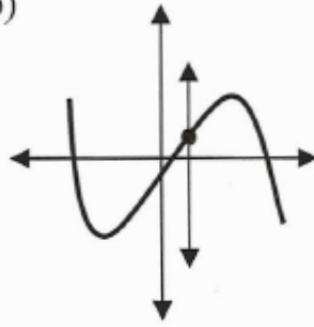


8. Which of the following graphs describes instantaneous rate of change?

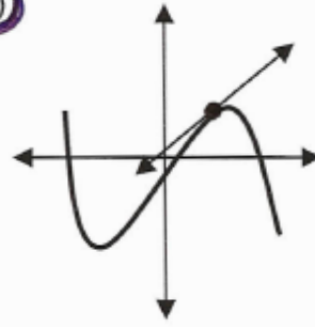
a)



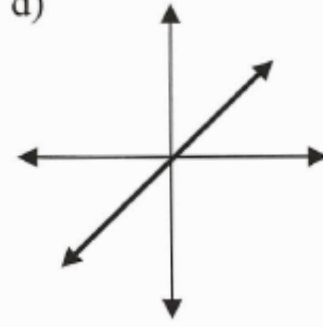
b)



**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.

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

\* Constant on  $D_2$



QUADRATIC!

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

$$y = \underline{-3x^2 + 4x + 10}$$

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

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.