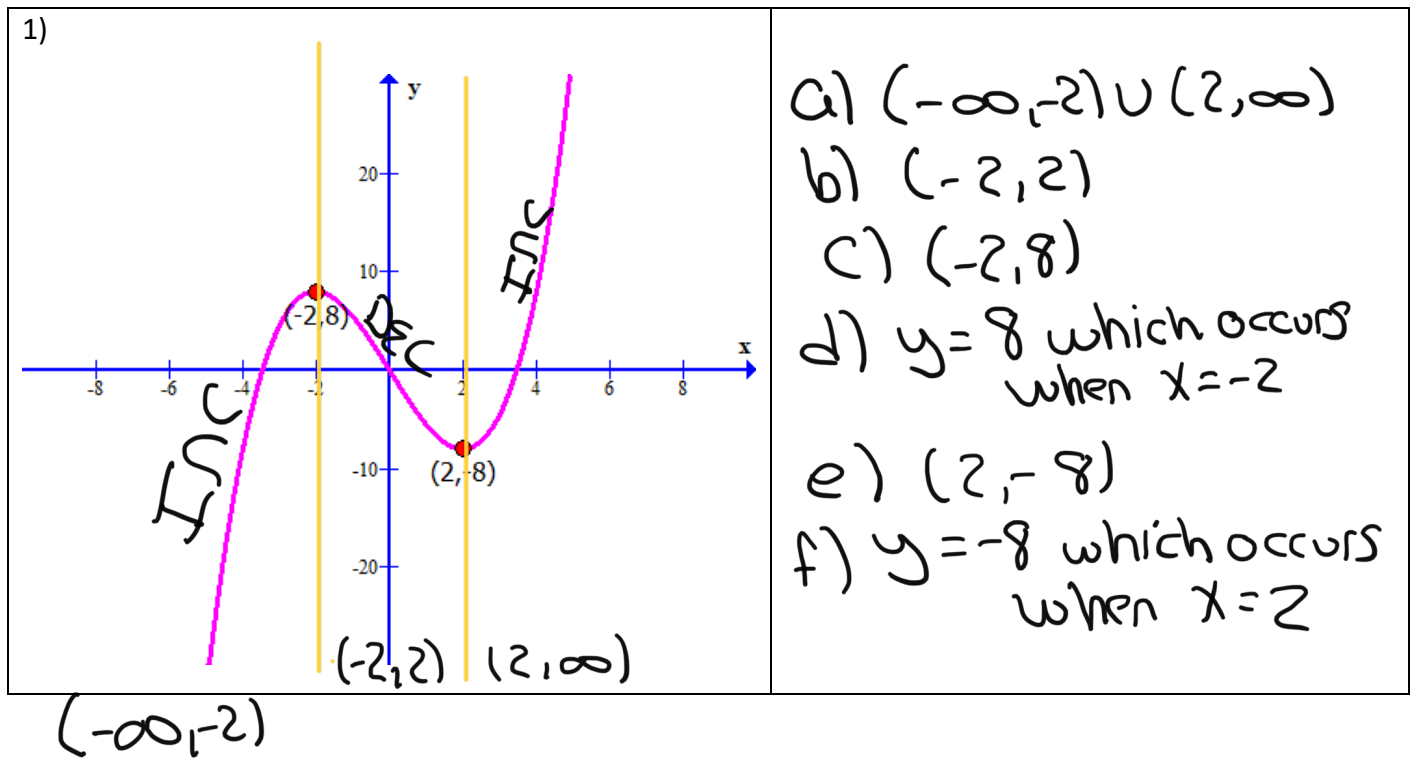


Section 3.3: Increasing and decreasing functions.

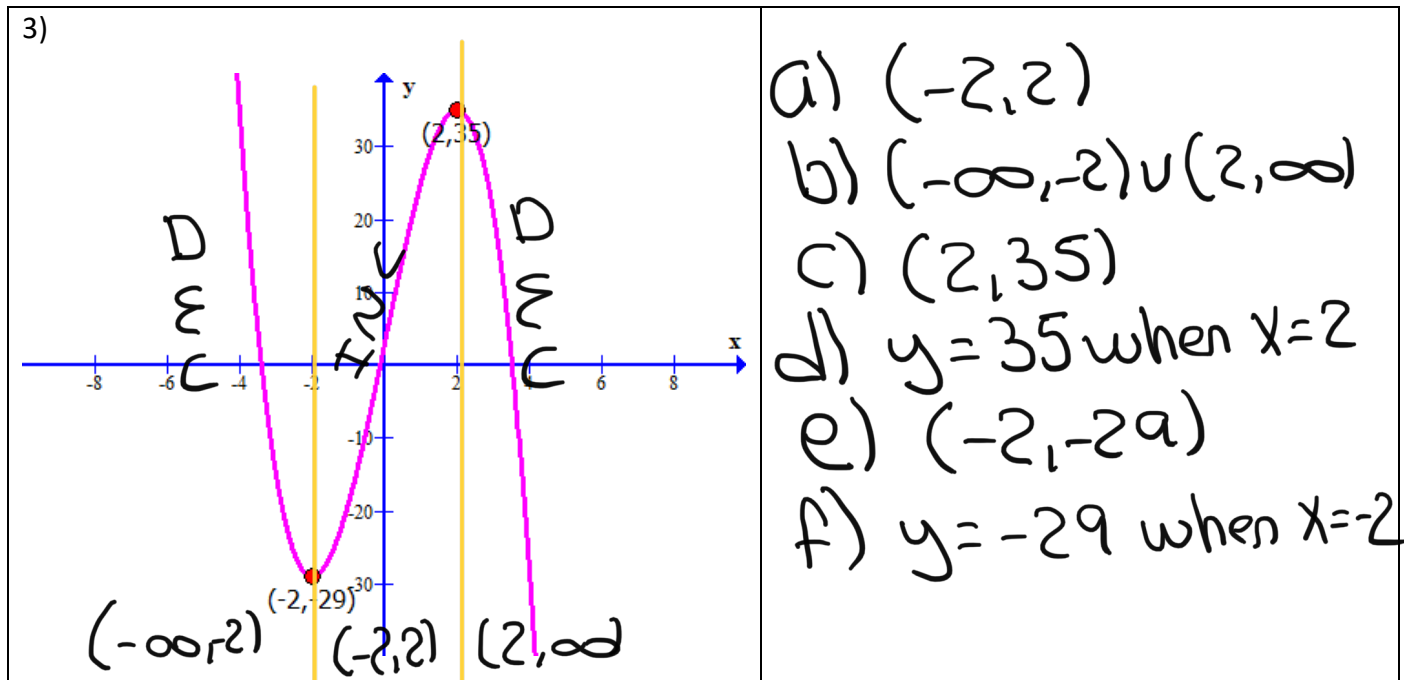
#1 – 10: Find the

- interval(s) where the graph is increasing.
- interval(s) where the graph is decreasing.
- the coordinates of local maximum point, if any
- the local maximum value
- the coordinates of the local minimum point if any
- the local minimum value



#1 – 10: Find the

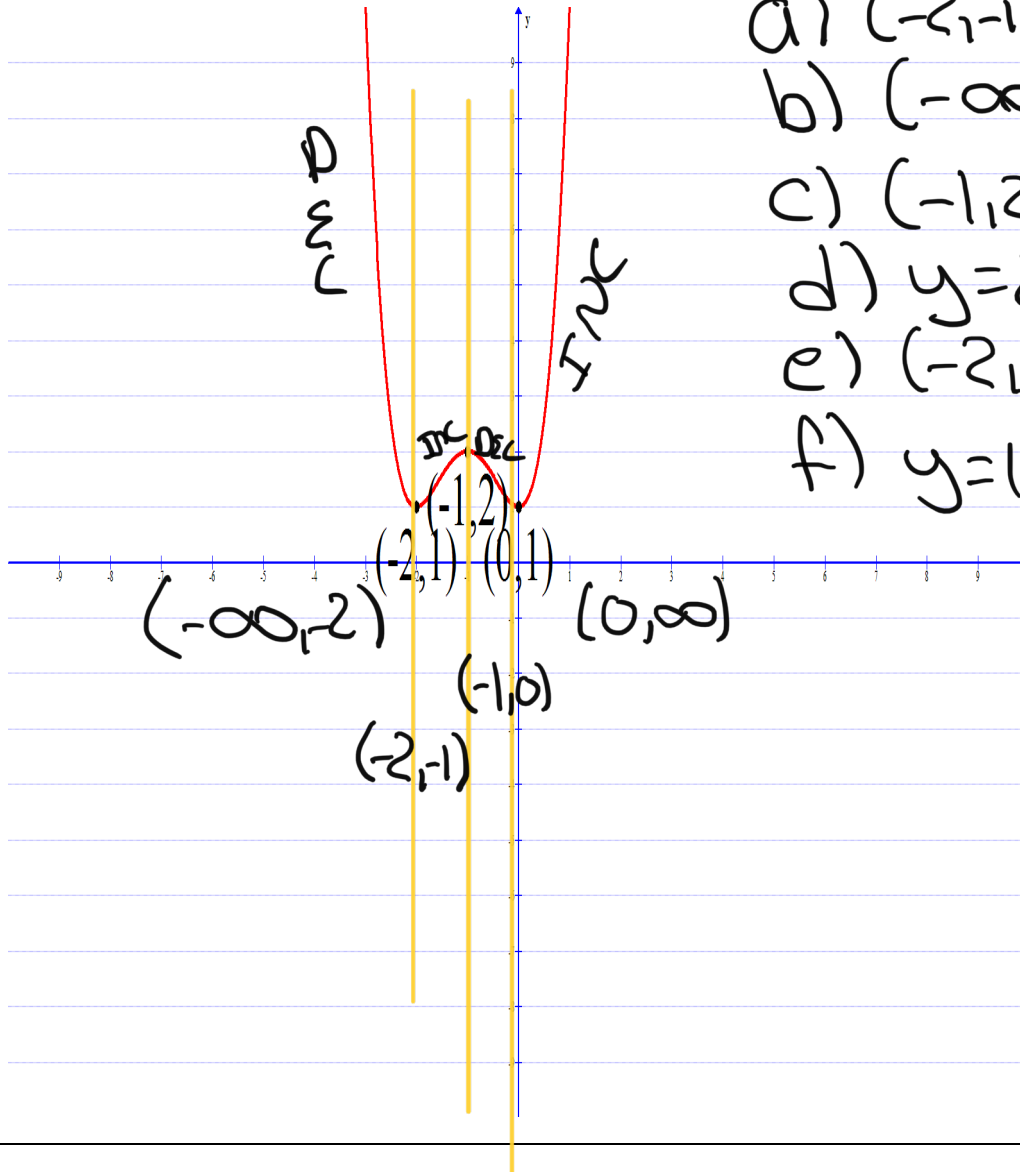
- interval(s) where the graph is increasing.
- interval(s) where the graph is decreasing.
- the coordinates of local maximum point, if any
- the local maximum value
- the coordinates of the local minimum point if any
- the local minimum value



#1 – 10: Find the

- interval(s) where the graph is increasing.
- interval(s) where the graph is decreasing.
- the coordinates of local maximum point, if any
- the local maximum value
- the coordinates of the local minimum point if any
- the local minimum value

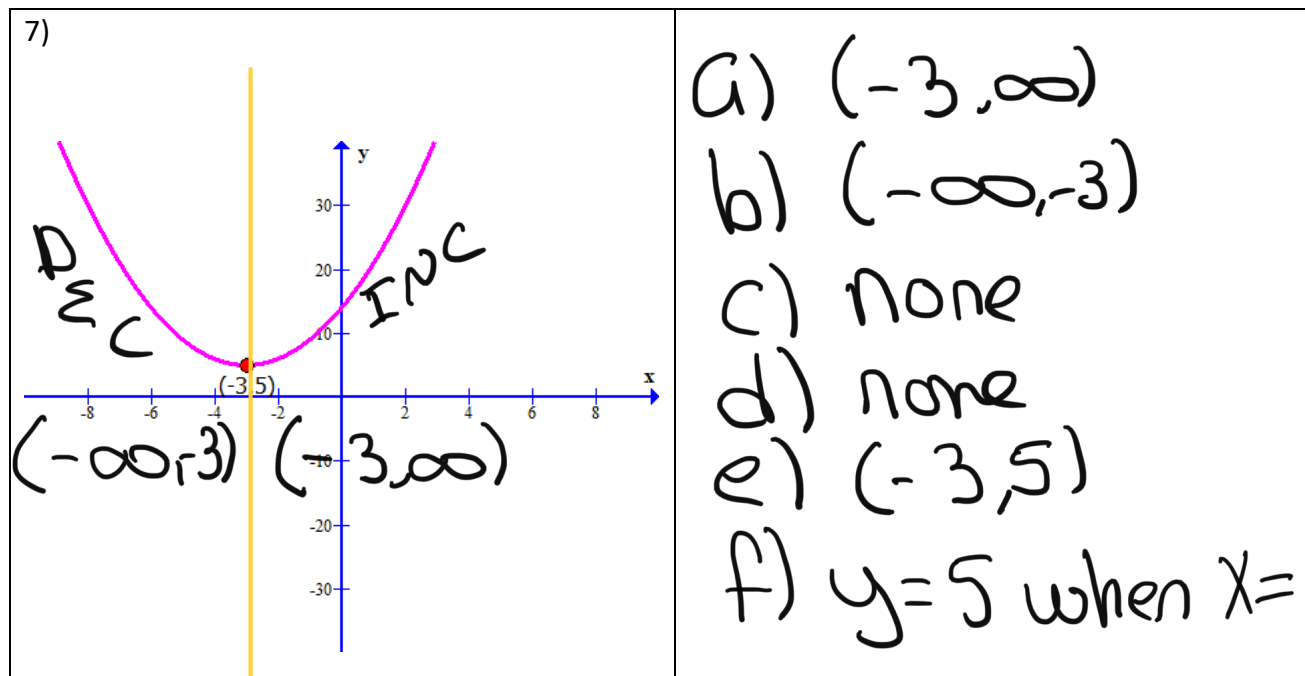
5)



- $(-\infty, -2) \cup (0, \infty)$
- $(-2, -1) \cup (-1, 0)$
- $(-1, 2)$
- $y = 2$  when  $x = -1$
- $(-2, 1) \text{ \& } (0, 1)$
- $y = 1$  when  $x = -2, 0$

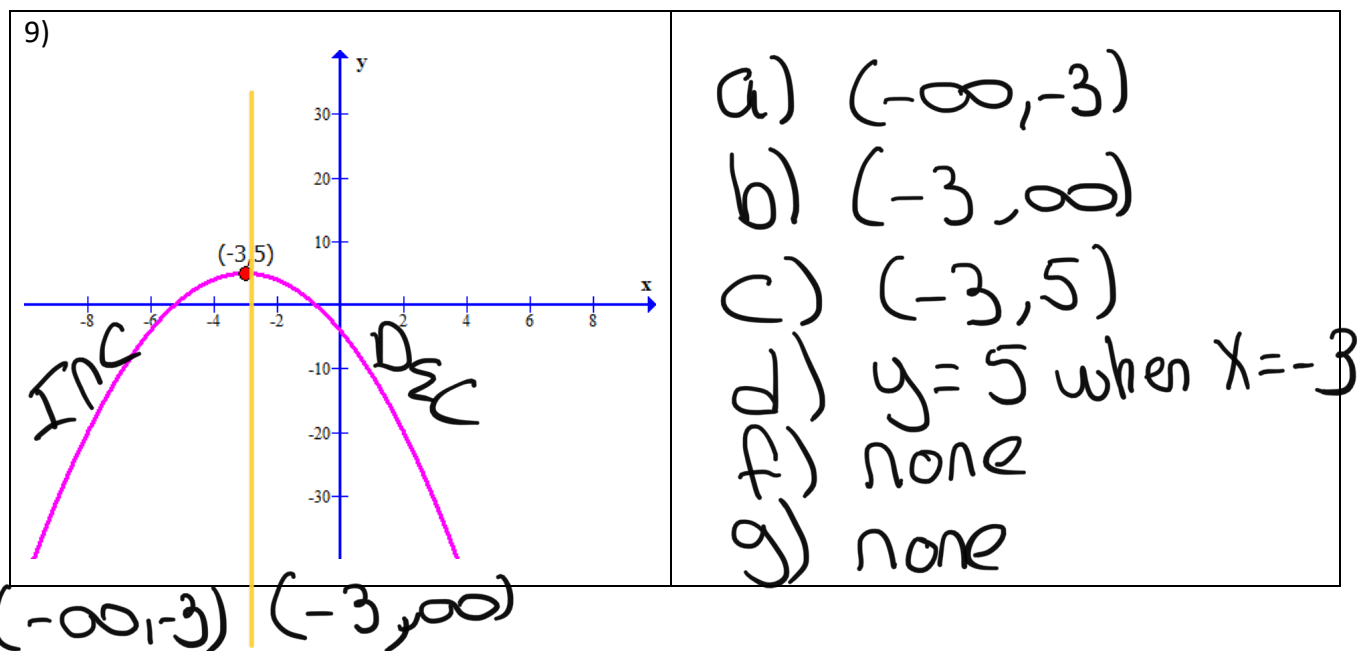
#1 – 10: Find the

- interval(s) where the graph is increasing.
- interval(s) where the graph is decreasing.
- the coordinates of local maximum point, if any
- the local maximum value
- the coordinates of the local minimum point if any
- the local minimum value



#1 – 10: Find the

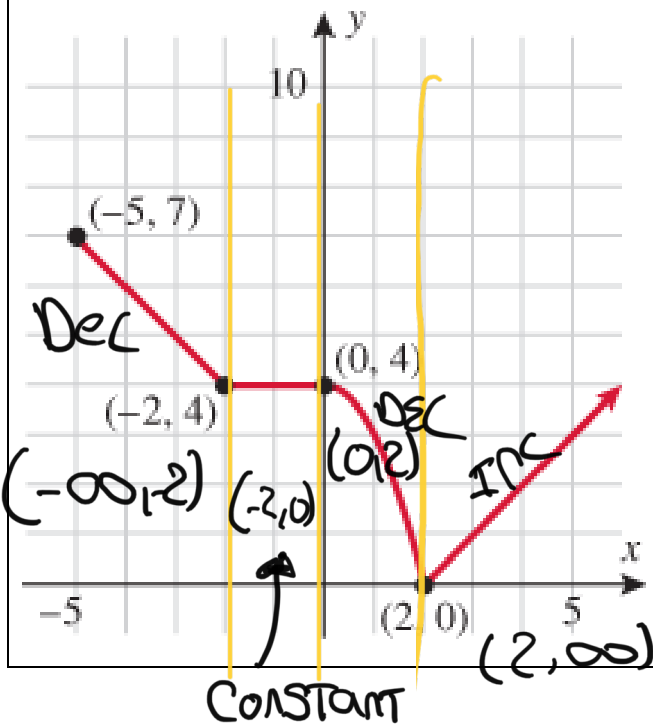
- interval(s) where the graph is increasing.
- interval(s) where the graph is decreasing.
- the coordinates of local maximum point, if any
- the local maximum value
- the coordinates of the local minimum point if any
- the local minimum value



#11 – 12: Find the

- a) interval(s) where the graph is increasing.
- b) interval(s) where the graph is decreasing.
- c) interval(s) where graph is constant
- d) the coordinates of local maximum point if any
- e) the local maximum value
- f) the coordinates of the local minimum point if any
- g) the local minimum value

11)

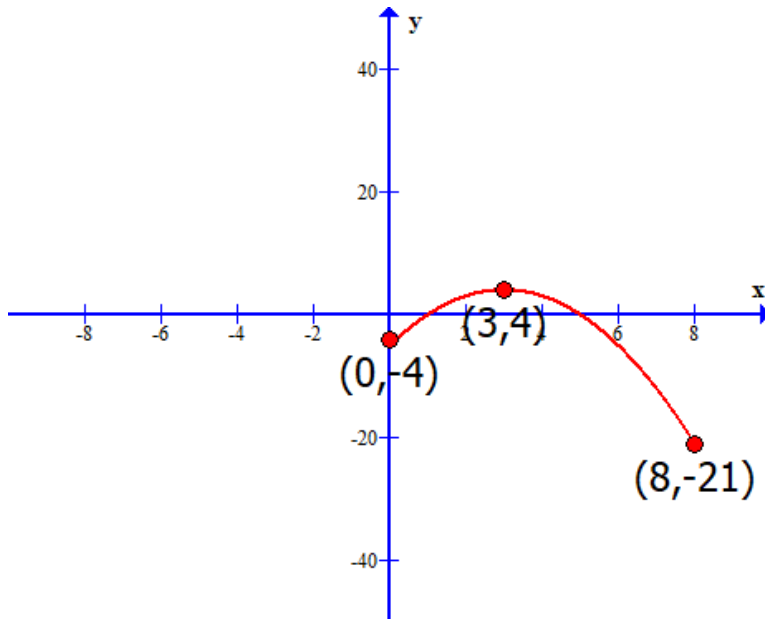


- a)  $(2, \infty)$
- b)  $(-5, -2) \cup (0, 2)$
- c)  $(-2, 0)$
- d)  $(-5, 7)$
- e)  $y = 7$  when  $x = -5$
- f)  $(2, 0)$
- g)  $y = 0$  when  $x = 2$

#13 – 16:

- Coordinates of the absolute maximum point.
- Value of the absolute maximum
- Coordinates of the absolute minimum point
- Value of the absolute minimum

13)

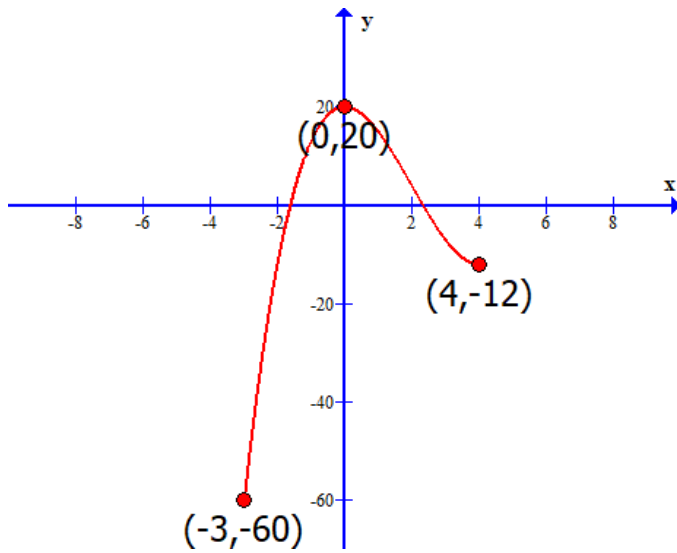


- $(3, 4)$
- $y = 4$  when  $x = 3$
- $(8, -21)$
- $y = -21$  when  $x = 8$

#13 – 16:

- a) Coordinates of the absolute maximum point.
- b) Value of the absolute maximum
- c) Coordinates of the absolute minimum point
- d) Value of the absolute minimum

15)



- a)  $(0, 20)$
- b)  $y = 20$  when  $x = 0$
- c)  $(-3, -60)$
- d)  $y = -60$  when  $x = -3$



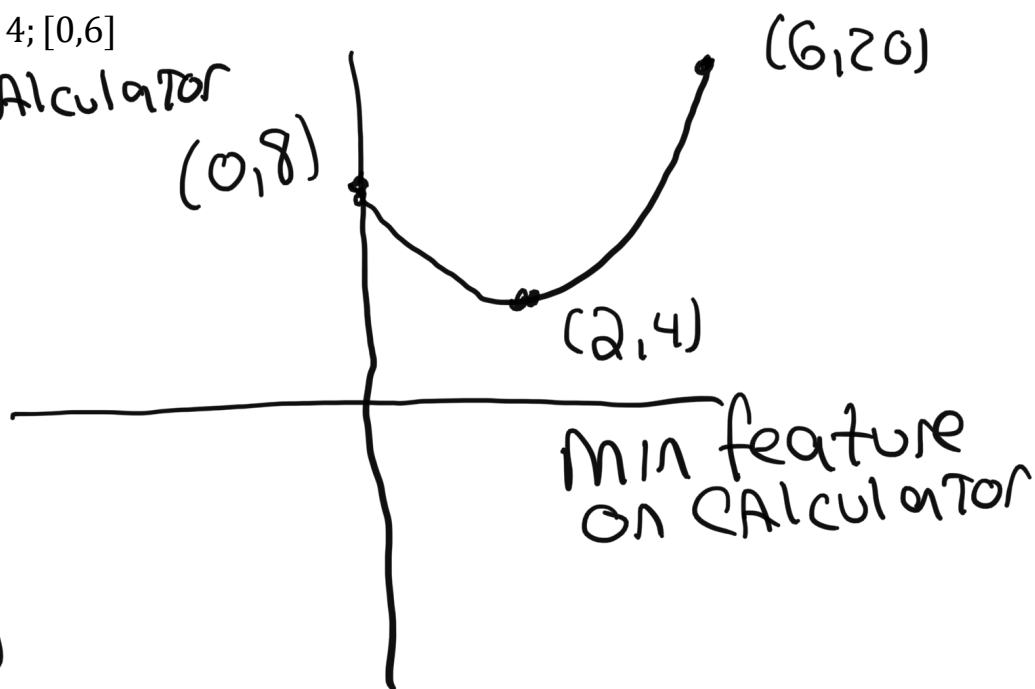
#17 – 20: Sketch a graph of the function of the indicated interval and find the following:

- Coordinates of the absolute maximum point.
- Value of the absolute maximum
- Coordinates of the absolute minimum point
- Value of the absolute minimum

17)  $f(x) = (x - 2)^2 + 4; [0,6]$

Table on Calculator

0	8
6	20



- $(6, 20)$
- $y = 20$  when  $x = 6$
- $(2, 4)$
- $y = 4$  when  $x = 2$

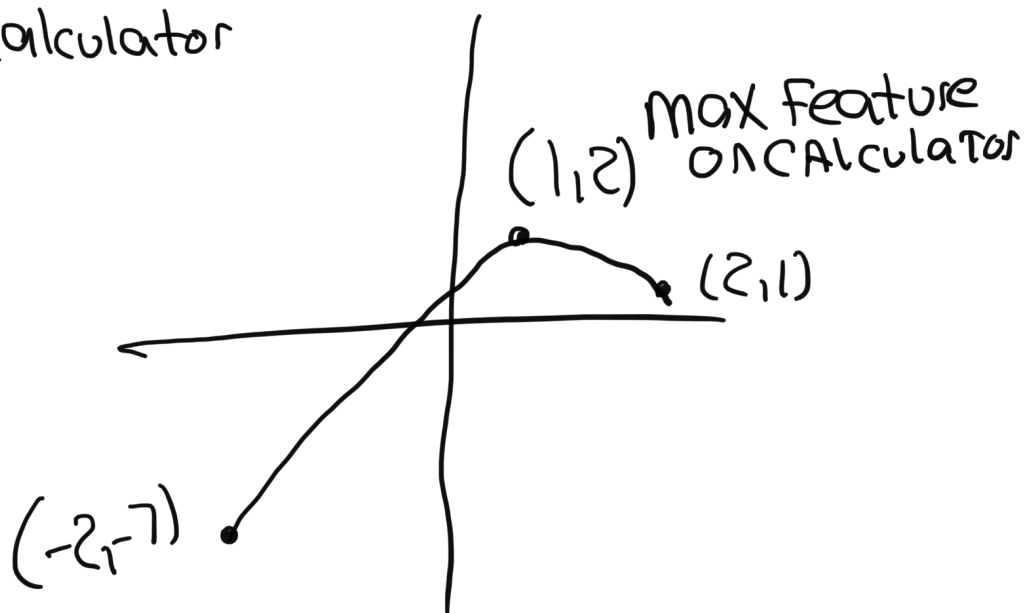
#17 – 20: Sketch a graph of the function of the indicated interval and find the following:

- Coordinates of the absolute maximum point.
- Value of the absolute maximum
- Coordinates of the absolute minimum point
- Value of the absolute minimum

19)  $f(x) = -(x - 1)^2 + 2; [-2, 2]$

Table on Calculator

-2	-7
2	1



- $(1, 2)$
- $y = 2$  when  $x = 1$
- $(-2, -7)$
- $y = -7$  when  $x = -2$

21) Find the average rate of change of  $f(x) = (x-2)^2 - 4$

a) from 1 to 2

$$f(1) = (1-2)^2 - 4 = -3$$

$$(1, -3)$$

$$f(2) = (2-2)^2 - 4 = -4$$

$$(2, -4)$$

$$\text{Average rate of } \Delta = \frac{-4 - (-3)}{2 - 1} = \frac{-4 + 3}{1} = \frac{-1}{1} = \boxed{-1}$$

b) from 3 to 5

$$f(3) = (3-2)^2 - 4 = -3$$

$$f(5) = (5-2)^2 - 4 = 5$$

$$(3, -3) \quad (5, 5)$$

$$\text{Average rate of } \Delta = \frac{5 - (-3)}{5 - 3} = \frac{8}{2} = \boxed{4}$$

23) find the average rate of change of  $f(x) = x^3 - 2x + 1$

a) from -3 to -2

$$f(-3) = (-3)^3 - 2(-3) + 1 = -20$$

$$f(-2) = (-2)^3 - 2(-2) + 1 = -3$$

$$(-3, -20) \quad (-2, -3)$$

$$\text{Avg rate of } \Delta = \frac{-3 - (-20)}{-2 - (-3)} = \frac{-3 + 20}{-2 + 3} = \boxed{17}$$

b) from -1 to 1

$$f(-1) = (-1)^3 - 2(-1) + 1 = 2$$

$$f(1) = (1)^3 - 2(1) + 1 = 0$$

$$(-1, 2) \quad (1, 0)$$

$$\text{Avg rate of } \Delta = \frac{0 - 2}{1 - (-1)} = \frac{-2}{1 + 1} = \frac{-2}{2} = \boxed{-1}$$