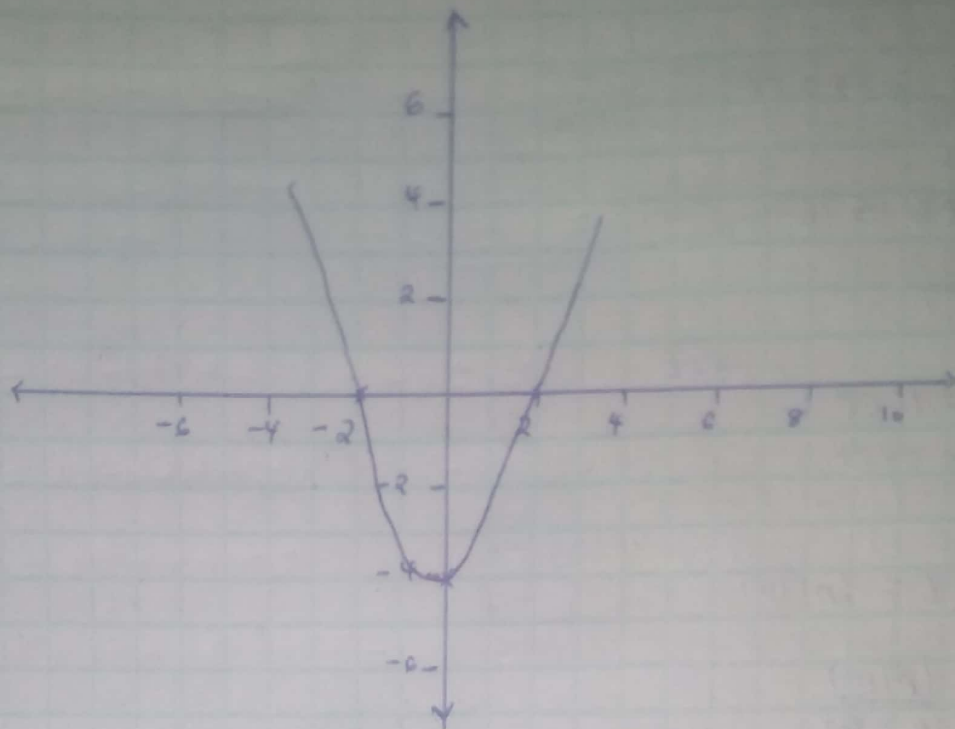


# IBRAHIM ALABBAD

1.



$$x\text{-int} : (-2, 0), (2, 0)$$

$$y\text{-int} : (0, -4)$$

2.  $(2, -9)$  and  $(-2, -6)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - (-9)}{-2 - 2} = \frac{+3}{-4} = -\frac{3}{4}$$

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

$$y + 9 = -\frac{3}{4}(x - 2)$$

$$y = -\frac{3}{4}x + \frac{3}{2} - 9$$

$$y = -\frac{3}{4}x - \frac{15}{2}$$

3.  $(1, 2)$  and  $(-1, 2)$

$$m = \frac{2 - 2}{-1 - 1} = 0$$

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

$$y - 2 = 0(x - 1)$$

$$y = 2$$

4 Domain =  $(0, \infty)$

5 Domain =  $(-\infty, \infty)$

Range =  $(-\infty, \infty)$

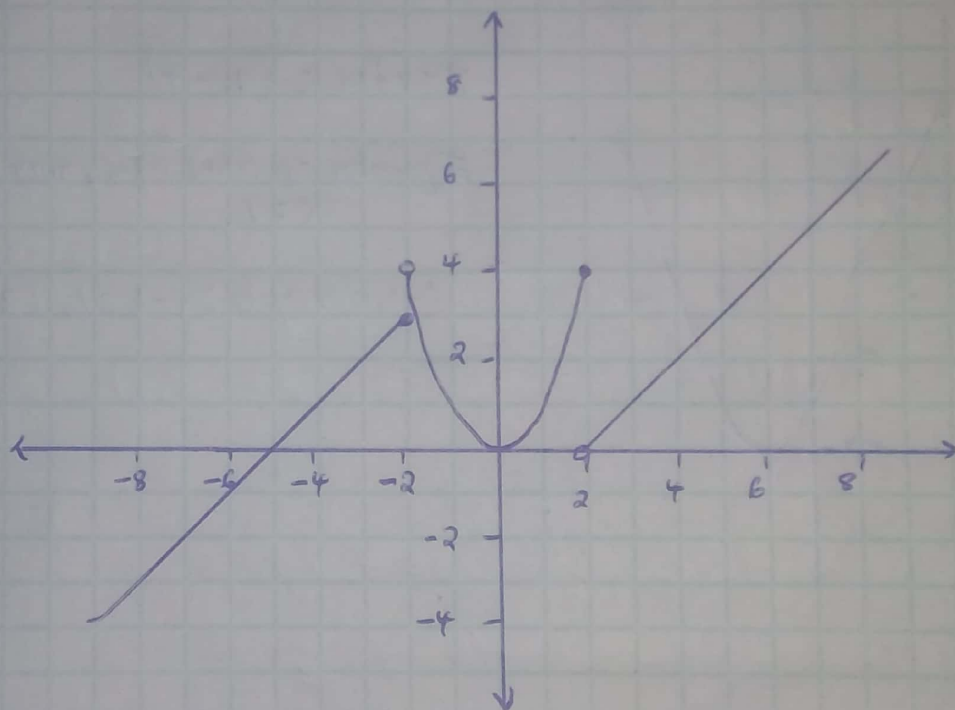
Relative Maximum point =  $\left(\frac{1-\sqrt{10}}{3}, \frac{-7\sqrt{10}-3+\sqrt{10}}{27}\right)$

Increasing Intervals =  $\left(-\infty, \frac{1-\sqrt{10}}{3}\right) \cup \left(\frac{1+\sqrt{10}}{3}, \infty\right)$

Relative Minimum Point =  $\left(\frac{1+\sqrt{10}}{3}, \frac{7\sqrt{10}-3-\sqrt{10}}{27}\right)$

Decreasing Intervals =  $\left(\frac{1-\sqrt{10}}{3}, \frac{1+\sqrt{10}}{3}\right)$

6



7  $h=1$        $x=2$   
 $k=4$        $y=5$

$$y = a(x-h)^2 + k$$

$$5 = a(2-1)^2 + 4$$

$$5 = a + 4$$

$$a = 1$$

$$y = 1(x-1)^2 + 4$$

$$y = 1(x^2 - 2x + 1) + 4$$

$$y = x^2 - 2x + 5$$

$$7 \quad h=1 \quad x=2$$

$$k=4 \quad y=5$$

$$y = a(x-h)^2 + k$$

$$5 = a(2-1)^2 + 4$$

$$5 = a + 4$$

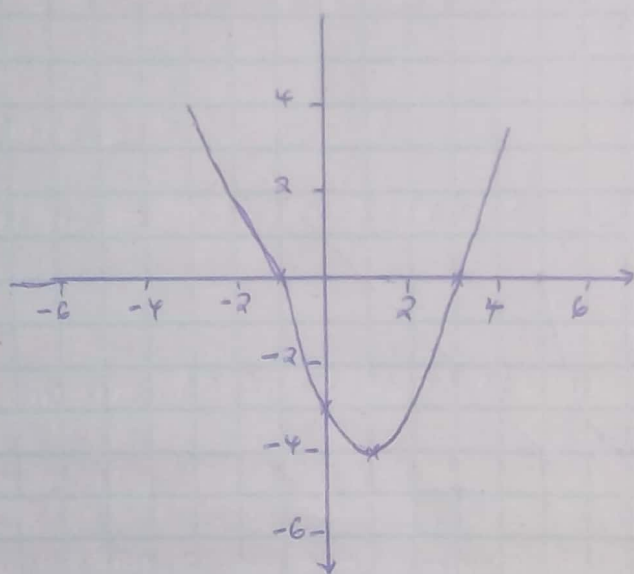
$$a = 1$$

$$y = (x-1)^2 + 4$$

$$= x^2 - 2x + 1 + 4$$

$$y = x^2 - 2x + 5$$

8.



Vertex:  $(1, -4)$

Equation of axis of symmetry  
 $x = 1$

x-intercepts:  $(-1, 0), (3, 0)$

9.

Right-hand: Rises Left-hand: Falls.

$$10 \quad f(x) = x^4 - 4x^3 + 4x^2$$

$$x^4 - 4x^3 + 4x^2 = 0$$

$$x^2(x^2 - 4x + 4) = 0$$

$$x^2(x-2)(x-2) = 0$$

$$x = 0, x = 2$$

$$\text{Zeros} = 0, 0, 2, 2$$

11 zeros = -2, 5, 3, -7

$$f(x) = (x+2)(x-5)(x-3)(x+7)$$

$$f(x) = x^4 + x^3 - 43x^2 + 23x + 210$$

12.

$$\begin{array}{r|rrrrrr} -2 & 1 & 1 & -43 & 23 & 210 \\ & & -2 & -4 & 24 & \\ \hline & 1 & -1 & -47 & 47 & 210 \end{array}$$

$$\begin{array}{r} x^2 + 4x - 10 \\ x^2 + 2 \overline{) x^4 + 4x^3 - 8x^2 + 12x - 6} \\ \underline{x^4 + 2x^2} \phantom{- 6} \\ 4x^3 - 10x^2 + 12x - 6 \\ \underline{4x^3 + 8x} \phantom{- 6} \\ -10x^2 + 4x - 6 \\ \underline{-10x^2 - 20} \phantom{- 6} \\ 4x + 14 \end{array}$$

$$= x^2 + 4x - 10 + \frac{4x + 14}{x^2 + 2}$$

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$$\begin{array}{r} x^3 + 6x^2 + 29x + 112 \\ x - 4 \overline{) x^4 + 2x^3 + 5x^2 - 4x - 7} \\ \underline{x^4 - 4x^3} \phantom{+ 5x^2 - 4x - 7} \\ 6x^3 + 5x^2 - 4x - 7 \\ \underline{6x^3 - 24x^2} \phantom{- 4x - 7} \\ 29x^2 - 4x - 7 \\ \underline{29x^2 - 116x} \phantom{- 7} \\ 112x - 7 \\ \underline{112x - 448} \\ 441 \end{array}$$

$$= x^3 + 6x^2 + 29x + 112 + \frac{441}{x-4}$$

14

$$= 8 - 76$$

$$15 \quad x^2 + 2x + 6 = 0$$

$$x = \frac{-2 \pm \sqrt{4 - 24}}{2} = \frac{-2 \pm \sqrt{-20}}{2}$$

$$= \frac{-2 \pm 2\sqrt{5}i}{2}$$

$$= -1 \pm \sqrt{5}i$$

$$x = -1 + \sqrt{5}i, x = -1 - \sqrt{5}i$$

$$16 \quad f(x) = x^3 + 4x^2 - 11x + 30$$

$$\text{Zeros} = -2, 3, -5$$

$$\text{factors} = (x+2)(x-3)(x+5)$$

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Domain:  $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$  x-intercepts:  $(5, 0)$

y-intercept:  $(0, \frac{5}{3})$

equation of vertical asymptote(s):  $x = -1, x = 1$

equation of horizontal asymptote(s):  $y = \frac{1}{3}$