

$$f(x) = \sqrt{1-x^2} \rightarrow D_f = [-1, 1]$$

$$rg - wf = \{(-1, 2), (0, 5), (1, 4)\}$$

$$\rightarrow 2 + 5 + 4 = 11$$

1

$$f(x) = 2x - 1, D_f = [3, +\infty) \rightarrow R_f = [5, +\infty)$$

$$g(x) = \frac{x}{3} + 3, D_g = (-\infty, 3] \rightarrow R_g = (-\infty, 4]$$

$$R_f \cup R_g = (-\infty, 4] \cup [5, +\infty)$$

$$f(3) = 5 \quad f(4) = 7 \Rightarrow \text{صعودی است}$$

$$g(3) = 4 \quad g(4) = \frac{11}{3} \Rightarrow \text{نزولی است}$$

2

$$-\frac{x^2}{4} + x + 3 > \frac{3}{4} \rightarrow -\frac{x^2}{4} + x + \frac{9}{4} > 0$$

$$-\frac{x^2}{4} + x + \frac{9}{4} = 0 \rightarrow -(x^2 - 4x - 9) = 0 \rightarrow -(x-3)(x+1) = 0 \rightarrow x = 3 \text{ و } -1$$

$$\frac{x}{-1} \mid \frac{-1}{-1} \mid \frac{9}{-1} \rightarrow x \in (-1, 3)$$

$$\Rightarrow \sqrt{b-a} = \sqrt{3-(-1)} = 2$$

3

$$y = |x-1| + |x-3| + |2x-4|$$

$$\begin{array}{c|c|c|c} 1 & 2 & 3 & \\ \hline \wedge - 4x & 4 - 2x & 2x - 2 & 4x - 4 \end{array}$$

$$\frac{x \leq 1}{1 < x \leq 2} \rightarrow R = [4, +\infty)$$

$$2 < x \leq 3 \rightarrow R = [2, 4)$$

$$3 < x \leq 4 \rightarrow R = (2, 4]$$

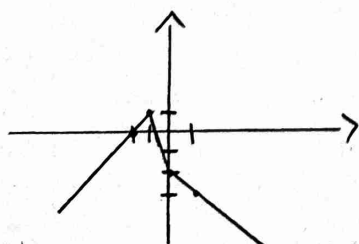
$$x > 4 \rightarrow R = [4, +\infty)$$

$$\min y = 2$$

4

$$y = |x| - 2|x+1|$$

$$\begin{array}{c|c|c} -1 & 0 & \\ \hline x+2 & 3x-2 & -x-2 \end{array}$$



$$y \in (-\infty, 1]$$

5

$$y = \frac{x^2 + \alpha x + m}{x+1} \rightarrow x^2 + \alpha x + m = yx + y \rightarrow x^2 + (\alpha - y)x + m - y = 0$$

$$x = \frac{y - \alpha \pm \sqrt{y^2 - 4y + 2\alpha - 4m + 4y}}{2} \Rightarrow y^2 - 4y + 2\alpha - 4m \geq 0 \rightarrow \alpha \geq 0, \alpha \leq 0$$

$$\rightarrow 34 - 100 + 14m \leq 0 \rightarrow 14m \leq 66 \rightarrow m \leq 4$$

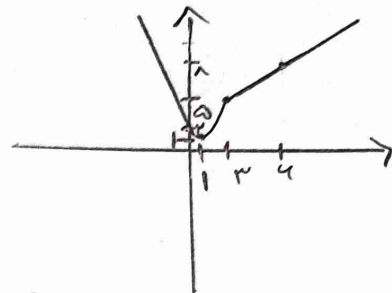
$$m \in \mathbb{N} \Rightarrow m = \{1, 2, 3, 4\}$$

$$x > 3 \rightarrow R = [0, +\infty)$$

$$0 < x < 3 \rightarrow R = [1, 0)$$

$$x \leq 0 \rightarrow R = (2, +\infty)$$

$$R = [1, +\infty)$$

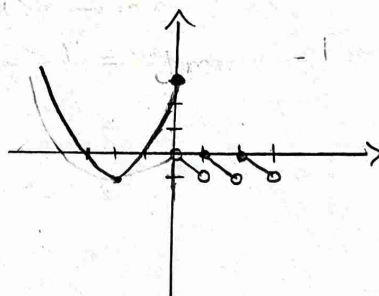


$$-1 > [0] - 0 > 0$$

$$x > 0 \rightarrow R = (-1, 0]$$

$$x \leq 0 \rightarrow R = [-1, +\infty)$$

$$\Rightarrow R_f = [-1, +\infty)$$



$$y = \alpha + 1 - \sqrt{2x+3}$$

$$2x+3 \geq 0 \rightarrow x \geq -\frac{3}{2} \rightarrow D_f = [-\frac{3}{2}, +\infty) \rightarrow b = -\frac{3}{2}$$

$$y = (-\infty, \underbrace{\alpha+1}_{\max}] \rightarrow \alpha+1 = \omega \Rightarrow \alpha = 4 \leftarrow \text{زمانی بود بیشترین حالت است که } \sqrt{2x+3} \text{ برابر صفر باشد}$$

$$ab = -\frac{3}{2} \times 4 = -6$$

$$f(x) + g(x) = 3\sqrt{2+2\sqrt{1-x}} = \sqrt{18+18\sqrt{1-x}} = \sqrt{(3\sqrt{1+x} + 3\sqrt{1-x})^2}$$

$$f(x) = 2\sqrt{x+1} + 4\sqrt{1-x} \rightarrow g(x) = \sqrt{x+1} - \sqrt{1-x}$$

$$y = \frac{f(x)}{4} - \frac{g(x)}{3} = \frac{f(x) - 4g(x)}{4} = \frac{4\sqrt{1-x}}{4} = \sqrt{1-x}$$

$$R_y = [0, +\infty)$$