

$$f(x) = \sqrt{1-x^2} \quad g = \{(-1, 1)(0, 4)(2, 5)(1, 2)\}$$

$$2g - 3f \rightarrow D = D_f \cap D_g = \{(-1)(0)(1)\}$$

$$\rightarrow 2g - 3f = \{(-1, 2)(0, 5)(1, 4)\}$$

$$\rightarrow R_{2g-3f} = \{2, 5, 4\} \rightarrow \text{مجموع} = 2+4+5 = 11 \checkmark$$

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

$$g(x) = \frac{1}{x}x+3 \quad D_g = (-\infty, +3] \rightarrow R_g = (-\infty, 4]$$

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

$$y = -\frac{x^2}{4} + x + 3 \quad x \in (a, b) \quad y > \frac{3}{4}$$

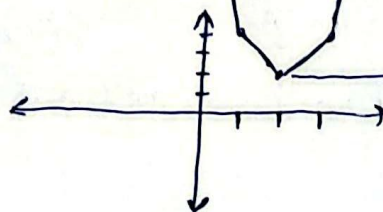
وقتی گفته بیشتر مقدار یعنی باید وقتی x برابر a و b باشد برابر $\frac{3}{4}$ شوند.

$$\rightarrow -\frac{x^2}{4} + x + 3 = \frac{3}{4} \rightarrow -x^2 + 2x + 3 = 0 \rightarrow x = \frac{-2 \pm \sqrt{4+12}}{-2}$$

$$\begin{cases} a = -1 \\ b = 3 \end{cases}$$

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

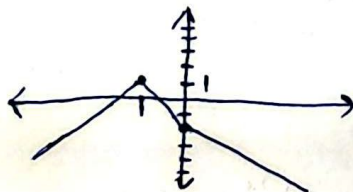
$$y = |x-1| + |x-3| + |x-4|$$



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

کمترین مقدار = 2 ✓

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



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

$$R_y = (-\infty, 1] \checkmark$$

$$y = \frac{n^2 + \Delta n + m}{n+1} \rightarrow n^2 + (\Delta - y)n + m - y = 0$$

$$\rightarrow n = \frac{-\Delta + y \pm \sqrt{2\Delta + y^2 - 10y - 4m + 4y}}{2}$$

$$\rightarrow y^2 - 4y + 2\Delta - 4m \geq 0 \rightarrow (y-2)^2 + 14 - 4m \geq 0$$

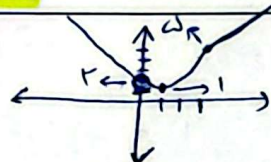
$$\rightarrow m \leq 4 \quad \textcircled{1}$$

$$\rightarrow m = 4 \rightarrow m \neq 4 \quad \textcircled{2}$$

$$n \neq -1 \text{ ریشه خارج } \frac{1}{f(n)=-1} \rightarrow -1 = \frac{-\Delta + y \pm \sqrt{(y-2)^2 + 14 - 4m}}{2}$$

$$\textcircled{1} \textcircled{2} \rightarrow 1, 2, 3 \quad \checkmark$$

$$f(n) = \begin{cases} n+2 & n \geq 2 \\ n^2 - 2n + 2 & 0 \leq n < 2 \\ |n| + 2 & n < 0 \end{cases}$$

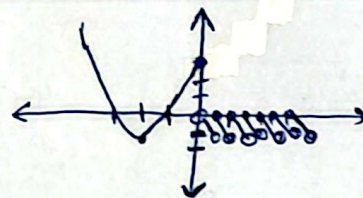


$$n^2 - 2n + 2 \rightarrow -\frac{b}{2a} = -\frac{-2}{2} = 1 \rightarrow \min$$

$$-\frac{\Delta}{4a} = -\frac{4-4}{4} = 1$$

$$R_f = [1, +\infty) \quad \checkmark$$

$$f(n) = \begin{cases} n^2 + 4n + 2 & n \leq 0 \\ [2n] - 2n & n > 0 \end{cases}$$



ریشه های معادله قبلی قبل صفر است و چون فقط قبل صفرش را داریم یعنی دار min است.

$$f(0) = 2 \quad -\frac{\Delta}{4a} = -\frac{14-12}{4} = -1$$

$$R_f = (-1, 0] \cup [-1, +\infty) = [-1, +\infty) \quad \checkmark$$

$$y = a+1 - \sqrt{2n+3} \quad P_y = [b, +\infty) \quad R_y = (-\infty, \Delta]$$

می دانیم هرچه n بیشتر کنیم جواب نهایی منفی تری شود پس در ازای Δ جواب ما $-\infty$ شده و برای بدست آوردن بالاترین مقدار Δ باید کمترین n (b) را قرار دهیم.

$$a+1 - \sqrt{2b+3} = \Delta \rightarrow b = \text{کمترین مقدار} = -\frac{3}{2} \rightarrow a+1 = \Delta \rightarrow a = 4 \quad \checkmark$$

$$\rightarrow ab = 4 \times (-\frac{3}{2}) = -6 \quad \checkmark$$

$$f(n) = 2\sqrt{n+1} + 4\sqrt{1-n}$$

$$f(n) + g(n) = 2\sqrt{2+2\sqrt{1-n^2}}$$

$$D_f = D_g = [-1, 1]$$

$$1-n^2 = (1-n)(1+n) \rightarrow \frac{\sqrt{1-n}}{\sqrt{1+n}} = a$$

$$\rightarrow 2\sqrt{2+2\sqrt{(1-n)(1+n)}} = 2\sqrt{2+2ab} \xrightarrow{\text{مربع}} (a+b)^2 = a^2 + b^2 + 2ab = 2 + 2ab$$

$$\rightarrow 2\sqrt{2+2ab} = 2\sqrt{(a+b)^2} = 2(a+b) = f(n) + g(n)$$

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

$$\rightarrow y = \frac{f(n)}{4} - \frac{g(n)}{3} = \frac{2\sqrt{n+1} + 4\sqrt{1-n}}{4} - \frac{\sqrt{1+n} - \sqrt{1-n}}{3} = \frac{\sqrt{n+1} + 3\sqrt{1-n}}{3} = \sqrt{1-n}$$

$$\rightarrow y = \sqrt{1-n} \rightarrow P_y = D_f \cap D_g = [-1, 1] \quad \begin{matrix} \max y \rightarrow n = -1 \\ \min y \rightarrow n = 1 \end{matrix}$$

$$\rightarrow R_y = [0, \sqrt{2}] \quad \checkmark$$