

$$f(x) = \{(-1, 0), (0, 1), (1, 0)\} \rightarrow {}^3f = \{(-1, 0), (0, 3), (1, 0)\}$$

$${}^2g = \{(-1, 2), (0, 1), (1, 4)\}$$

$${}^2g - {}^3f = \{(-1, 2), (0, 5), (1, 4)\} \rightarrow R = \{2, 5, 4\} \rightarrow \boxed{2+5+4=11}$$

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$$f(3) = 5 \Rightarrow R_f = [5, +\infty), g(3) = 4 \Rightarrow R_g = [-\infty, 4]$$

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

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$$g = \frac{-x^2}{r} + x + 3 \rightarrow \text{ext} \begin{cases} \frac{-b}{2a} = \frac{-1}{-1} = 1 \\ y = \frac{1}{r} + 1 + 3 = \frac{4}{r} \end{cases} \Rightarrow$$

$$y = \frac{4}{r} \rightarrow -3 = -x^2 + 2x \rightarrow x^2 - 2x - 3 = 0 \rightarrow x = -1, x = 3$$

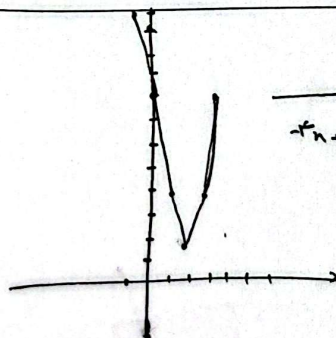
$$b = 3, a = -1 \Rightarrow \sqrt{b - a_{\min}} = \sqrt{3 - (-1)} = \sqrt{4} = 2$$

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$$y = |x-1| + |x-3| + |x-5|$$

x	-1	0	1	2	3
y	12	8	4	2	4

$$\text{کمترین مقدار} = 2 \rightarrow y_{\min} = 2$$



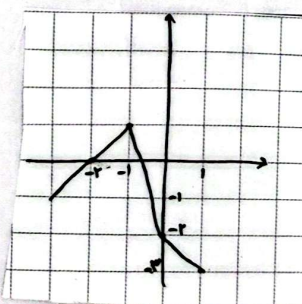
	1	2	3
$-x_{n+1}$	$-x_n + 4$	$x_n - 2$	$x_n - 1$

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

	-1	0
$n+2$	$-n-2$	$-n-1$

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



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$$y = \frac{x^r + \alpha n + m}{x+1} = \frac{(x+\varepsilon)(x+1)(m-\varepsilon)}{x+1} = y$$

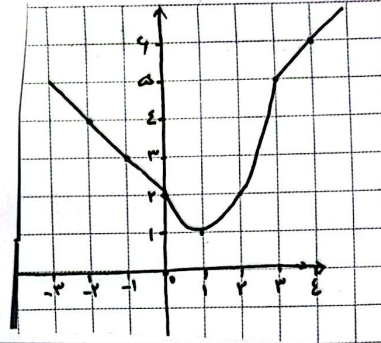
$$\textcircled{1} m = \varepsilon \rightarrow y = x + \varepsilon \Rightarrow x \neq -1 \Rightarrow y \neq r \Rightarrow m \neq \varepsilon$$

$$\textcircled{2} y_{n+y} = x^r + \alpha n + m \Rightarrow n^r + (-y + \alpha)n + m - y = 0 \Rightarrow b^r - \varepsilon \alpha c = (\alpha - y)^r - \varepsilon(m - y) \geq 0 \Rightarrow y^r - \log y + r\alpha - \varepsilon m + \varepsilon y \geq 0$$

$$y - r)^r - \varepsilon(m - \varepsilon) \geq 0 \xrightarrow{y=r} r(m - \varepsilon) \geq 0 \rightarrow m \leq \varepsilon \xrightarrow{\text{on } \mathbb{R}} m = \{1, r, r\}$$

$$f(n) = \begin{cases} x+r & ; n \geq r \\ n^r - rn + r & ; -1 \leq n < r \\ |n| + r & ; n < 0 \end{cases}$$

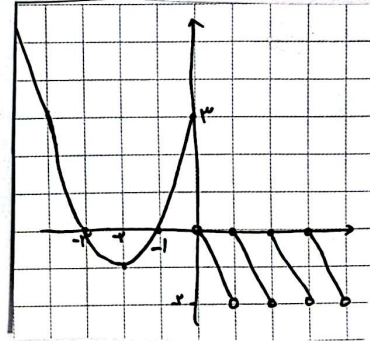
$$R_f = [-1, +\infty)$$



$$f(n) = \begin{cases} n^r + \varepsilon n + r & ; x \leq 0 \rightarrow [-1, +\infty) \\ [rn] - rn & ; n > 0 \\ \hookrightarrow -1 \leq [rn] - rn < 0 \end{cases}$$

$$[-1, +\infty) \cup (-1, 0] \Rightarrow$$

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



$$rn + r \geq 0 \rightarrow rn \geq -r \rightarrow n \geq -\frac{r}{r} \rightarrow b = -\frac{r}{r}$$

$$(-\infty, \alpha] \rightarrow \alpha = a + 1 - \sqrt{0} \Rightarrow \alpha = a + 1 \Rightarrow a = \varepsilon \Rightarrow \alpha b = \varepsilon \times -\frac{r}{r} = -\varepsilon$$

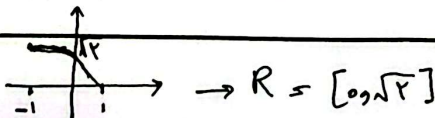
$$D_f = D_g = [-1, 1]$$

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

$$|\sqrt{1+n} + \sqrt{1-n}| \Rightarrow f(n) + g(n) = r(\sqrt{1+n} + \sqrt{1-n}) \rightarrow \frac{f(n)}{r} + \frac{g(n)}{r} = \sqrt{1+n} + \sqrt{1-n}$$

$$\frac{f(n)}{r} = \sqrt{1+n} + \sqrt{1-n} - \frac{g(n)}{r} \rightarrow \frac{r f(n)}{r} = \frac{r}{r} (\sqrt{1+n} + \sqrt{1-n}) \rightarrow \frac{r f(n)}{r} - \frac{r}{r} f(n) = \sqrt{1+n} + \sqrt{1-n} - \frac{g(n)}{r} +$$

$$(-(\sqrt{1+n} + r \sqrt{1-n})) \rightarrow \frac{f(n)}{r} - \frac{g(n)}{r} = \sqrt{1+n} + r \sqrt{1-n} - \sqrt{1+n} - \sqrt{1-n} = \frac{f(n)}{r} - \frac{g(n)}{r} = \sqrt{1-n}$$



$$\rightarrow R = [0, \sqrt{r}]$$