

Date:

Sub: $\text{گسٹریٹھ$ - لکھنؤ

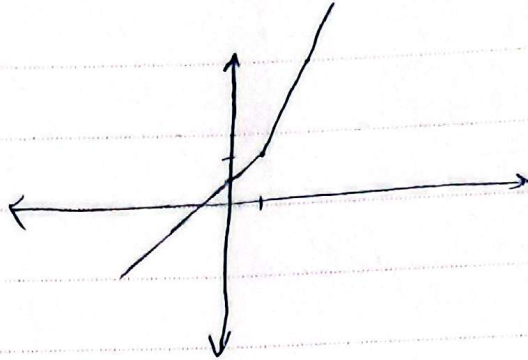
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الف) $(r, 2), (r, n-n) \rightarrow n-n=2 \rightarrow n=1 \quad (-1, 2)(-1, 2) \text{ جو } -1$
 $\rightarrow n=2 \rightarrow (r, 2)(m, 2) \rightarrow m=2$ 5

ب) $(m, 3), (2, 3) \rightarrow m=2 \rightarrow (a, 1), (1, 1) \rightarrow a=1 \rightarrow (1, 1)(1, 2) \rightarrow n=2$

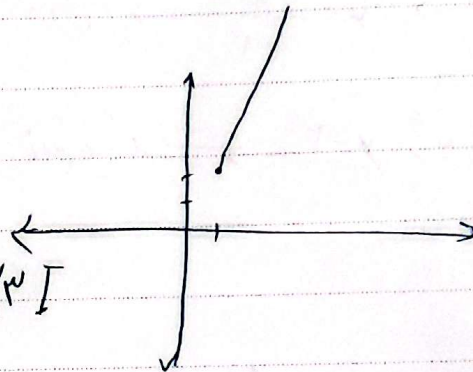
$$f(n) = \begin{cases} r_{n-1}, & n \geq 1 \\ m+a, & n < 1 \end{cases}$$

$n < 1 \rightarrow m+a \leq r \rightarrow a \leq r$



$$f(n) = \begin{cases} r_{n-1}, & n \geq 1 \\ a_{n-1}, & n < 0 \end{cases}$$

$n=0 \rightarrow a-1 \leq r \rightarrow a \leq r+1 \Rightarrow a \leq r+1$



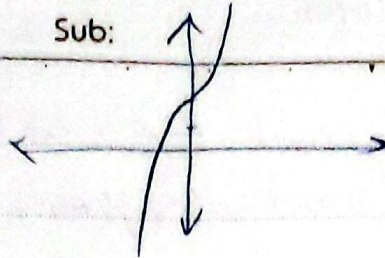
$a > 0 \leftarrow \text{مستطیل } \Pi$

$\text{I} \cap \text{II} \rightarrow 0 < a \leq r$

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الف) $y = x^3 + 2$



تابع یک به یک است

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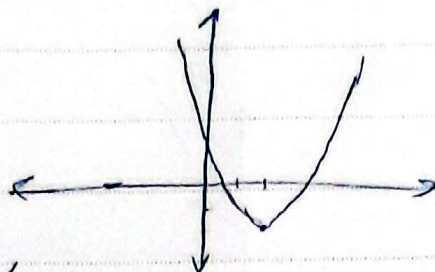
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$$x = y^3 + 2$$

$$y = \sqrt[3]{x-2} \Rightarrow f^{-1}(x) = \sqrt[3]{x-2}$$

ب) $y = x^2 - 4x + 2$

$$\frac{f}{g} = 2 \quad f = 1 + 2 = 2$$



تابع یک به یک نیست

الف) $y = \frac{x^2 + 1}{x - 2}$ تابع هورادافیک یک به یک است

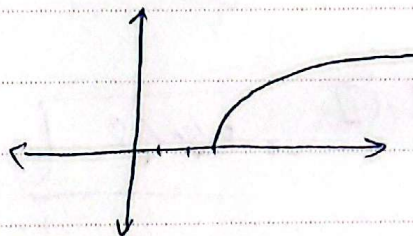
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$$x = \frac{y^2 + 1}{y - 2} \Rightarrow y = \frac{x^2 + 1}{x - 2} \Rightarrow f^{-1}(x) = \frac{x^2 + 1}{x - 2}$$

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ب) $y = \frac{x^2 + 2x}{x + 2} \Rightarrow y = 2 \rightarrow$ تابع یک به یک نیست

الف) $y = \sqrt{x-3}$



تابع یک به یک است

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$$x = \sqrt{y-3}$$

$$x^2 + 3 = y \Rightarrow f^{-1}(x) = x^2 + 3, \quad x \geq 0$$

ب) $y = x^2 - 4x + 3, \quad x \in [2, +\infty)$

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

حل اول
الف) $\frac{f}{g} = 2 \Rightarrow$ تابع یک به یک است

$$y = (x^2)^2 - 1 \Rightarrow x = (y^2)^2 - 1 \Rightarrow x = \pm \sqrt{y+1} + 2$$

$$R_{f^{-1}} \geq 2 \Leftarrow R_{f(x)} \geq 2$$

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$$y = n + \sqrt{n} = \left(\sqrt{n} + \frac{1}{\sqrt{n}}\right)^2 - \frac{1}{n} \Rightarrow n = \left(\sqrt{y} + \frac{1}{\sqrt{y}}\right)^2 - \frac{1}{y} \rightarrow \sqrt{y} = \sqrt{n + \frac{1}{y}} - \frac{1}{\sqrt{y}} - \sqrt{n}$$

$$\rightarrow y = n + \frac{1}{y} + \frac{1}{y} - \sqrt{n + \frac{1}{y}} \rightarrow f^{-1}(n) = n + \frac{1}{y} - \sqrt{n + \frac{1}{y}}$$

$$\rightarrow a=1, b=\frac{1}{y}, c=-\frac{1}{y} \rightarrow 1 + f\left(\frac{1}{y}\right) + f\left(-\frac{1}{y}\right) = \boxed{1}$$

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$$f(n_1) = f(n_2) \Rightarrow \frac{n_1}{\sqrt{n_1^2 - y}} = \frac{n_2}{\sqrt{n_2^2 - y}} \rightarrow \frac{n_1^2}{n_1^2 - y} = \frac{n_2^2}{n_2^2 - y} \rightarrow n_1^2 = n_2^2 \rightarrow n_1 = \pm n_2$$

$$y = \frac{n}{\sqrt{n^2 - y}} \rightarrow n = \frac{y}{\sqrt{y^2 - y}} \rightarrow n^2 = \frac{y^2}{y^2 - y} \rightarrow y = \pm \sqrt{\frac{y^2 n}{n^2 - 1}} \rightarrow f^{-1}(n) = \frac{\sqrt{y} n}{\sqrt{n^2 - 1}}$$

نفس الشيء

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$$f\left(-\frac{y}{a}\right) \rightarrow f^{-1}(n) = \frac{n}{1+|n|} \rightarrow \frac{n}{1+|n|} = -\frac{y}{a} \rightarrow -y - y|n| = an$$

$$\downarrow$$

$$n = -\frac{y}{y}$$

$$g^{-1}\left(-\frac{y}{a}\right) \rightarrow g(n) = \sqrt{n} - 1 \rightarrow \sqrt{n} - 1 = -\frac{y}{a} \rightarrow n = \frac{9}{16}$$

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$$-\frac{y}{y} + \frac{9}{16} = \frac{-a + y}{y a} = \frac{-y}{y a}$$

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$$g^{-1}(12) \rightarrow f(n) + \sqrt{f(n)} = 12 \rightarrow f(n) = 9 \rightarrow n^2 + 1 = 9 \rightarrow n = \pm 2$$

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$$f^{-1}(n) = \sqrt[n]{n-1} \rightarrow y = \sqrt[n]{n-1} \rightarrow n = \sqrt[y]{y-1} \rightarrow y = n^2 + 1 \rightarrow f(n) = n^2 + 1$$