

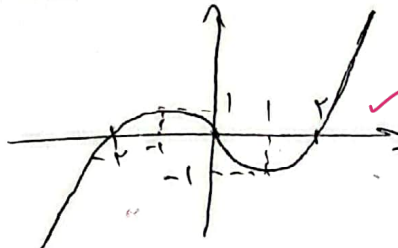
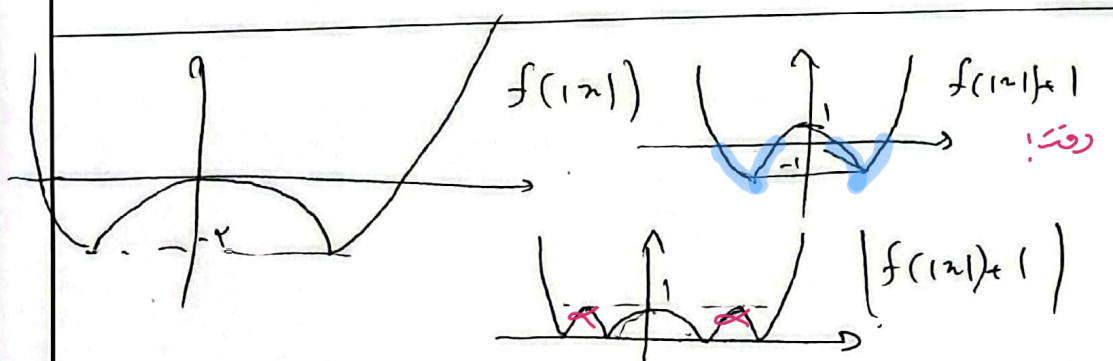
۱) $f(-n) - n f(n) = 2|n| + 1 \rightarrow \textcircled{P} f(-n) - n^2 f(n) = 2|n|n + n$
 $\textcircled{Q} f(n) + n f(-n) = 2|n| + 1 \xrightarrow{\textcircled{P}-\textcircled{Q}} n^2 f(n) + f(n) = -2|n|n - n$
 $f(n) = \frac{-2|n|n - n + 2|n|n + 1}{n^2 + 1} = \frac{1}{1+n^2} = \frac{(1-n)(2|n|+1)}{1+n^2}$ زیاتر!

۲) $f(n) + f(n) = n^2 - 2n + 6$
 $f(n) + f(n) = 6 \quad f(n) = n^2 - 2n + 3 \quad f(n^2) = n^4 - 2n^2 + 3$
 $f(0) = 3$

۳) $gn - y = n^2 + 2n + 1 \quad n^2 + (1-y)n + 2 + y = 0$
 $n = \frac{y-1 \pm \sqrt{y^2 - 2y + 1 - 4 - 4y}}{2} \quad y^2 - 4y - 3 \geq 0$
 $(y-5)(y+1) \geq 0$
 $y \in (-\infty, -1] \cup [5, +\infty)$

۱, ۵) الف) $y = 2n^2 - 5n + 1 \quad \frac{-b}{2a} = \frac{5}{4}$ رست! $\frac{2(\frac{25}{16}) + \frac{5}{4} + 1}{\frac{25}{16}} = \frac{49}{16}$
 $R: [\frac{49}{16}, +\infty)$
 ب) $y = \sqrt{-n^2 + 4n - 5}$ $\frac{-4}{-2} = 2$ $\frac{-4 \pm \sqrt{16 - 4(-5)}}{-2} = \frac{-4 \pm 6}{-2}$ $\min = 2$
 $R: [2, +\infty)$
 ج) $y = \sqrt{n^4 - 2n^2 + 5n + 1} \Rightarrow R: [0, +\infty)$
 د) $y = \log(n^2 - 2n^2 + 5n + 4) \quad R: (-\infty, +\infty)$

۱, ۵) الف) $y = \frac{2n+1}{n^2-4} \quad n = \frac{2y+1}{y^2-4} \quad y \neq \pm 2 \quad R_y = \{ \frac{3}{4} \}$
 ب) $y = \frac{2n-4}{\sqrt{5n+1}}$ $y^2 = \frac{4n+1}{n-2} \quad n = \frac{2y^2-1}{y^2+4} \quad y \in [0, +\infty)$
 ج) $y = \frac{n^2+3n+1}{\sqrt{2n^2+3}}$ $\sqrt{2n^2+3} + \frac{1}{\sqrt{2n^2+3}} \quad \min = \sqrt{2} + \frac{1}{\sqrt{2}} = \frac{3}{\sqrt{2}}$
 $y \geq \frac{3}{\sqrt{2}} \quad R_y = [\frac{3}{\sqrt{2}}, +\infty)$
 د) $y = 2n^2 + \frac{1}{2n^2+4}$ $y+4 \geq 4 + \frac{1}{4}$ $y \geq \frac{17}{4} \quad R_y = [\frac{17}{4}, +\infty)$

$y = \frac{3n^2 + 4}{n^2 - 1}$ $y = \frac{3n^2 + 4}{n^2 - 1} \Rightarrow 3n^2 + 4 = y(n^2 - 1) \Rightarrow 3n^2 + 4 = yn^2 - y \Rightarrow (3 - y)n^2 + (y + 4) = 0$ $y \neq 3 + \frac{4}{y-3} \Rightarrow y \in (-\infty, 3) \cup (3, +\infty)$ تذکره: این روش رودقیق از تو جهزده بین خیر قول سوالا نکتت فیلند	۱ ۶
$\sin x = \frac{3f(x) + 4}{f(x) - 2} \Rightarrow -1 \leq \frac{3f(x) + 4}{f(x) - 2} \leq 1$ $\frac{3f(x) + 4}{f(x) - 2} \leq 1 \Rightarrow \frac{3f(x) + 4 - f(x) + 2}{f(x) - 2} \leq 0 \Rightarrow \frac{2f(x) + 6}{f(x) - 2} \leq 0$ $\frac{2f(x) + 6}{f(x) - 2} \geq 0 \Rightarrow \frac{2f(x) + 6}{f(x) - 2} \geq 0$ چقدر سخت :- صفت بعد بین	۲ ۷
$y = \frac{3n^2 - 1}{n^2} \Rightarrow y = \frac{3n^2 - 1}{n^2} \Rightarrow y = 3 - \frac{1}{n^2}$ $y \in [0, +\infty)$	۲ ۸
$y = \begin{cases} n^2 - 2n & n \geq 0 \\ -n^2 - 2n & n \leq 0 \end{cases}$  $R = (-\infty, +\infty)$ $\mathbb{R}$ و $\mathbb{N}$	۲ ۹
 رفت!	۱, ۵ ۱۰

۵- برد مقابله محورهای $\mathbb{R} - \{ \frac{a}{c} \}$ است

ب) $R_y = \sqrt{\mathbb{R} - \{4\}} = [0, +\infty) - \{2\}$

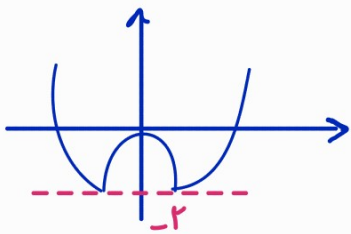
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نمونه: $\square = x^2 \rightarrow \begin{cases} x^2 = 0 \rightarrow y = -4 \\ x^2 \sim \infty \rightarrow y = 3 \end{cases} \xrightarrow[\text{مقدار}]{\text{محدوده مقبولة}} R_y = (-\infty, -4] \cup (3, +\infty)$

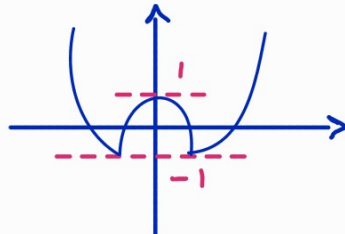
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$\square = \sin x \rightarrow \begin{cases} \sin x = -1 \rightarrow y = -\frac{1}{2} \\ \sin x = 1 \rightarrow y = -3 \end{cases} \xrightarrow[\text{مقدار}]{\text{محدوده مقبولة}} R_y = [-3, -\frac{1}{2}]$

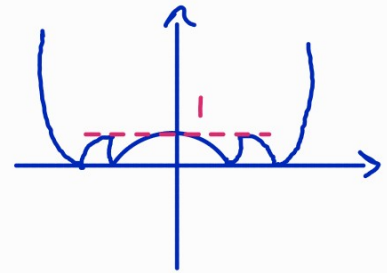
۱۰



$y = f(1-x)$



$y = f(|x|) + 1$



$y = |f(|x|) + 1|$