

$$\begin{cases} f(-n) - n f(n) = 2|m| + 1 \\ f(n) + n f(-n) = 2|m| + 1 \end{cases} \Rightarrow \begin{cases} -n f(-n) + n^2 f(n) = -2|m|n - n \\ f(n) + n f(-n) = 2|m| + 1 \end{cases}$$

$$n^2 f(n) + f(n) = 2|m| + 1 - 2|m|n - n \Rightarrow f(n)(n^2 + 1) = (2|m| + 1)(1 - n)$$

$$\Rightarrow f(n) = \frac{(2|m| + 1)(1 - n)}{1 + n^2} \checkmark$$

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

$$n = n^2 \rightarrow f(n^2) = n^4 - 2n^2 + \frac{1}{2} \checkmark$$

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

$$n = \frac{-(1 - y) \pm \sqrt{(1 - y)^2 - 4(2 + y)}}{2} \rightarrow \Delta \geq 0 \rightarrow (1 - y)^2 - 4(2 + y) \geq 0$$

$$y^2 - 6y - 7 \geq 0 \Rightarrow (y - 7)(y + 1) \geq 0 \rightarrow \frac{-1}{+} \frac{7}{+} \rightarrow R_f: (-\infty, -1] \cup [7, +\infty)$$

$$الف) y = 2n^2 - 3n + 1$$

$$\left| \frac{-b}{2a} = \frac{3}{4} \right| R_f: [-\frac{1}{4}, +\infty)$$

$$ب) y = \sqrt{-n^2 + 4n - 4} \rightarrow \sqrt{(-\infty, 4]} \rightarrow \left| \frac{-b}{2a} = \frac{-4}{-2} = 2 \right| R_f: [2, 4]$$

$$ج) y = \sqrt{n^2 - 3n^2 + 4n + 1} \rightarrow \sqrt{1R} \rightarrow R_f: [0, +\infty)$$

$$د) y = \log(n^2 - 4n^2 + 4n + 4) \rightarrow R_f: (-\infty, +\infty)$$

$$هـ) \frac{3n + 1}{2n - 4} \rightarrow R_f: \mathbb{R} - \left\{ \frac{3}{2} \right\} \checkmark$$

$$و) \sqrt{\frac{5n + 1}{n - 1}} \Rightarrow R_f: \mathbb{R} - \left\{ \frac{1}{5} \right\}$$

$$ز) \frac{n^2 + 3}{\sqrt{n^2 + 3}} + \frac{1}{\sqrt{n^2 + 3}} \Rightarrow \frac{\sqrt{n^2 + 3} + 1}{\sqrt{n^2 + 3}}$$

$$R_f: [1, +\infty)$$

قابلیت یکنواختی
نداره !!

$$ح) n^2 + 4 + \frac{1}{n^2 + 4} - 4 \rightarrow R_f: \left[\frac{1}{4}, +\infty \right)$$

صفحه آخر...

$$y = \frac{r^n + r}{r^n - 1} \rightarrow r^n y - y = r^n + r$$

$$-r^n + r^n y = r + y \rightarrow$$

$$r^n (y - r) = r + y$$

$$r^n = \frac{y + r}{y - r}$$

$$n = \frac{\log \frac{y+r}{y-r}}{\log r} \rightarrow R_f: (-\infty, -r] \cup (r, +\infty)$$

$$r^n = 0 \rightarrow \frac{r}{-1} \rightarrow -r$$

$$\lim_{n \rightarrow +\infty} \frac{r^{n+1} + r}{r^n - 1} = \frac{+\infty}{+\infty} \text{ hop}$$

$$\frac{y}{r^n} = r$$

$$R_f: (-\infty, -r] \cup (r, +\infty)$$

(2)

✓

$$\sin n \xrightarrow{n \rightarrow \frac{\pi}{2}} \frac{y}{-r} = -r$$

$$\sin n \xrightarrow{n \rightarrow -\frac{\pi}{2}} \frac{y}{-r} = -\frac{1}{r}$$

چون مثلث قائمه
مستطیل

$$R_f: [-r, \frac{1}{r}]$$

بازه: -2 تا 1/2

(2)

✓

$$\text{الف) } \left| \frac{r^n - 1}{r^n} \right|$$

$$R_f = \mathbb{R} \setminus \left\{ \frac{r}{r-1} \right\}$$

$$y = \frac{\sqrt{9n-18}}{-1+r^n} \text{ تابع ثابتة!}$$

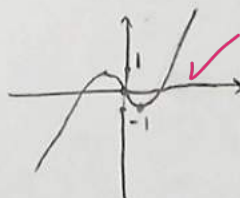
$$R_f: \mathbb{R} \setminus \left\{ \frac{r}{r-1} \right\}$$

0

✓

$$y = n |n| - r^n$$

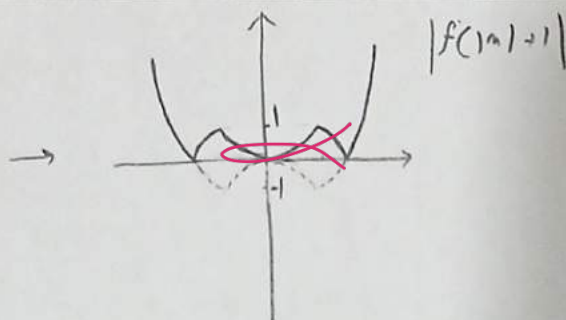
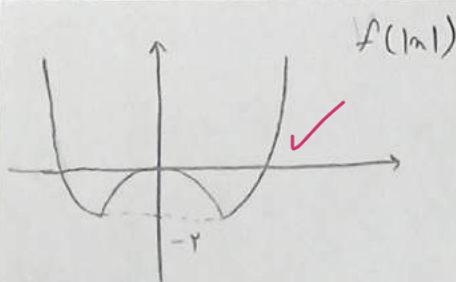
$$y = \begin{cases} n^2 - r^n & n \geq 0 \\ -n^2 - r^n & n < 0 \end{cases}$$



$$R_f = \mathbb{R} \setminus \{0\}$$

(2)

✓



(0, 1)

✓

۵- برد توابع هموار نیست $\{ \frac{a}{c} \} \cap \mathbb{R}$ است

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

ج) $y = \frac{x^2+3+1}{\sqrt{x^2+3}} = \sqrt{x^2+3} + \frac{1}{\sqrt{x^2+3}}$

$a > 0 \rightarrow \min a = \sqrt{3} \rightarrow y_{\min} = \frac{4\sqrt{3}}{3} \rightarrow R_y = [\frac{4\sqrt{3}}{3}, +\infty)$

الف) $R_y = |\mathbb{R} - \{\frac{3}{4}\}| = [0, +\infty)$

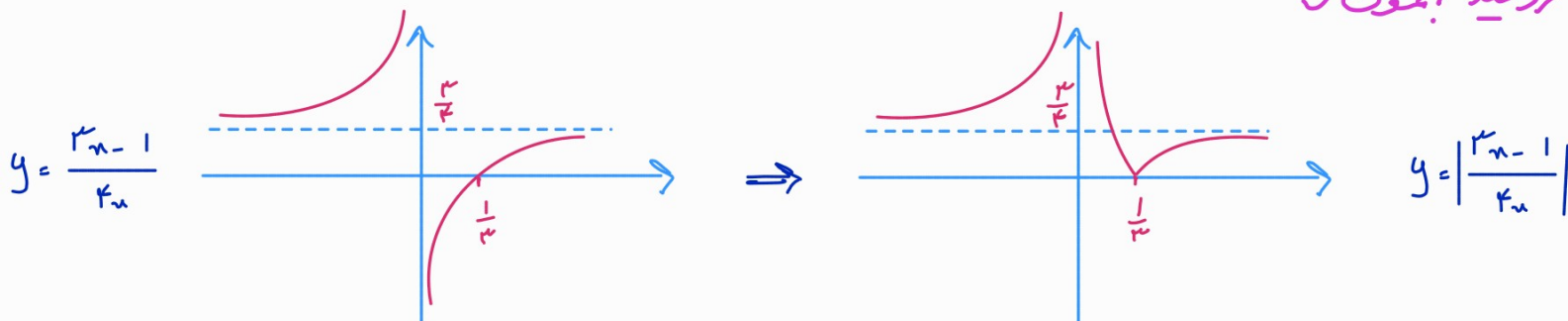
۸- اول برد عبارت داخل قدر مطلق

رد حساب می کنیم بعد قدر مطلق می گیریم

فقط حواست باشد که $y = \frac{3}{4}$ هم هست داخل برد

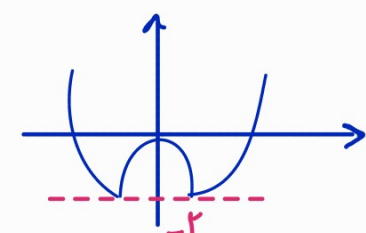
$y = -\frac{3}{4}$ عضو برد عبارت داخل قدر مطلق هست و وقتی قدر مطلق بگیریم $y = \frac{3}{4}$

روید به نمودار

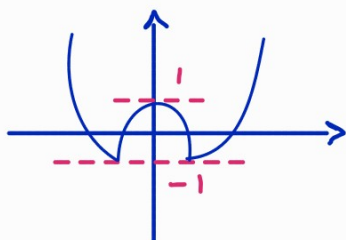


۸- ب) $y = \sqrt{\frac{4(n-2)}{f(n-2)}} = \sqrt{\frac{4}{f}} = \frac{2}{\sqrt{f}} \rightarrow R_y = \{\frac{2}{\sqrt{f}}\}$

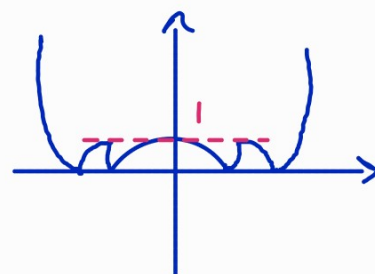
۱۵-



$y = f(1-x)$



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



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