

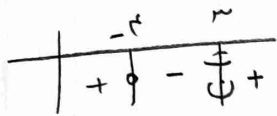
$\alpha = x \rightarrow f(-x) - x f(x) = 2 x + 1 \xrightarrow{\times x} x f(-x) - x^2 f(x) = 2x x + x \quad (1)$ $\alpha = -x \rightarrow f(x) + x f(-x) = 2 x + 1 \quad (2)$ $(2) - (1) = (1+x^2) f(x) = (1-x)(2 x +1) \rightarrow f(x) = \frac{(1-x)(2 x +1)}{1+x^2} \checkmark$	۱
$f(x) + f(0) = x^2 - 3x + 4 \rightarrow f(x) = ax^2 + bx + c, f(0) = c$ $\rightarrow f(x) + f(0) = ax^2 + bx + 2c \rightarrow a, b = 1, c = 3 \rightarrow f(x) = x^2 - 3x + 3$ $\rightarrow f(x^2) = x^4 - 3x^2 + 3 \checkmark$	۲
$y = \frac{x^2 + x + 2}{x - 1} \rightarrow yx - y = x^2 + x + 2 \rightarrow x^2 + (1-y)x + 2+y = 0$ $x = \frac{y-1 \pm \sqrt{y^2 - 4y - 4}}{2} \rightarrow y^2 - 4y - 4 \geq 0 \rightarrow y \in (-\infty, -1] \cup [5, +\infty) \checkmark$	۳
$y = -x^2 + 4x - 5 \rightarrow R_f = (-\infty, -\frac{5}{1}) = (-\infty, -5] \quad (1)$ $\rightarrow \sqrt{R_f} = [0, 4] \checkmark$	۴
$y = \log x^2 - 4x^2 + 5x + 1 \rightarrow \mathbb{R}$ $y \in \mathbb{R} \checkmark$	۵
$y = \sqrt{\frac{x+1}{x-2}} \rightarrow \frac{x+1}{x-2} \in \mathbb{R} - \{f\}$ $\rightarrow R_f \in [0, +\infty) - \{f\} \quad \text{وقت! } \{f\} \text{ } \{f\}$	۶
$y = x^2 + \frac{1}{x^2 + 2} = x^2 + 2 + \frac{1}{x^2 + 2} - 2$ $\rightarrow R_f \in [\frac{1}{2} - 2, +\infty) \rightarrow R_f \in [-\frac{3}{2}, +\infty) \checkmark$	۷

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

روش اصل:

$$y = \frac{rx^r + r}{x^r - 1}$$

$$\rightarrow \frac{y+r}{y-r} \geq 0 \rightarrow y \in (-\infty, -r] \cup (r, +\infty)$$



$$\left. \begin{array}{l} \max x^r = +\infty \rightarrow y = \frac{r \cdot \infty}{\infty} = r \\ \min x^r = 0 \rightarrow y = \frac{r}{-1} = -r \\ x^r - 1 = 0 \end{array} \right\} y \in (-\infty, -r] \cup (r, +\infty)$$

(2)
6

$$y = \frac{r \sin x + r}{\sin x - r}$$

$$\max \sin x = 1 \rightarrow y = \frac{r}{-r} = -1$$

$$\left. \begin{array}{l} \min \sin x = -1 \rightarrow y = \frac{r}{-r} = -1 \\ \sin x - r \neq 0 \end{array} \right\} y \in [-1, -1]$$

(2)
7

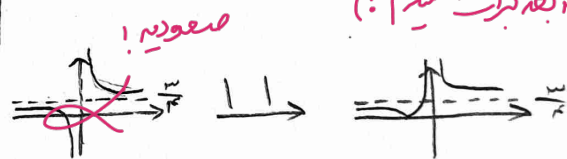
$$y = \sqrt{\frac{q(x-r)}{f(x-r)}} = \frac{r}{r}$$

$$\rightarrow R_f \in \{r\}$$

الف

$$y = \left| \frac{rx-1}{rx} \right|$$

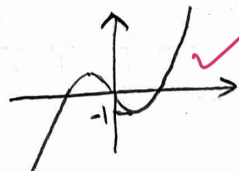
صفحه بعدی بزرگ شدیم!



$$\rightarrow R_f \in [0, +\infty)$$

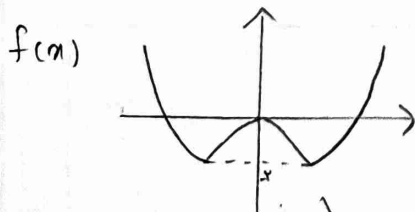
(1.5)
8

$$f(x) = \begin{cases} x^2 - rx & x \geq 0 \\ -x^2 - rx & x < 0 \end{cases}$$



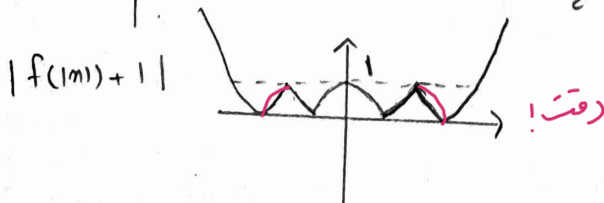
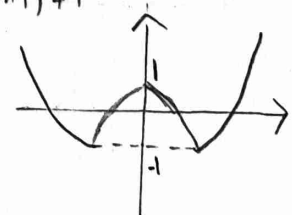
$$\rightarrow R_f \in \mathbb{R}$$

(2)
9



چون نمودار f(x) نسبت به محور
y متقارن است پس: f(x) = f(|x|)

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



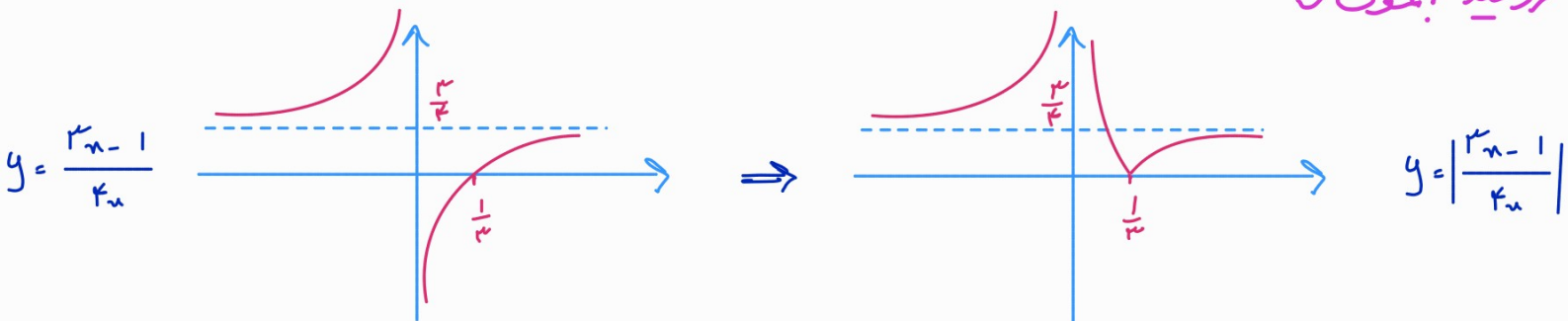
(1.5)
10

۸- اول برد عبارت داخل قدر مطلق
 رو حساب می کنیم بعد قدر مطلق می گیریم

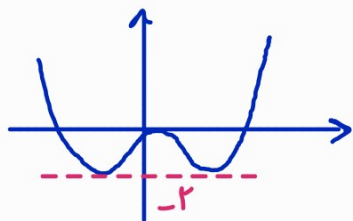
فقط خواست باشد که $y = \frac{3}{4}$ هم هست داخل برد

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

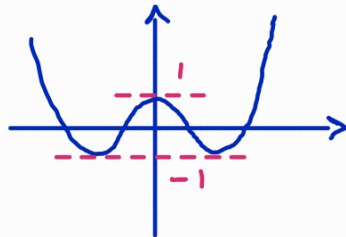
روید به نمودار:



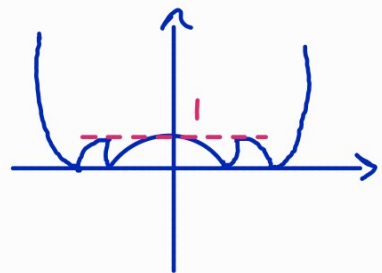
۱۰-



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



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



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