

گرسا، فنی تکتف سا،  $x < 0$  دوازیو پو سر  $A$

-1

$$\begin{cases} f(-x) - x f(x) = \sqrt{|x|} + 1 \\ f(x) + x f(-x) = \sqrt{|-x|} + 1 \end{cases}$$

$$\rightarrow \begin{cases} x f(-x) - x^2 f(x) = \sqrt{x} |x| + x \\ f(x) + x f(-x) = \sqrt{|x|} + 1 \end{cases}$$

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

$$\rightarrow f(x) = \begin{cases} \frac{-\sqrt{x} + x + 1}{x^2 + 1} & x \geq 0 \\ \frac{\sqrt{x} - x + 1}{x^2 + 1} & x < 0 \end{cases}$$

$$x=0 \rightarrow f(0) + f(0) = 0^r - r(0) + y$$

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$$\rightarrow f(0) = y \rightarrow f(0) = y$$

$$f(x) = x^r - rx + y$$

$$\rightarrow f(x^r) = (x^r)^r - r(x^r) + y = x^{r^2} - rx^r + y$$

$$\rightarrow yx - y = x^r + x + y$$

-1

$$\rightarrow x^r \in (1-y)x + r + y = 0$$

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

$$\rightarrow y^2 - 4y - 1 \geq 0$$

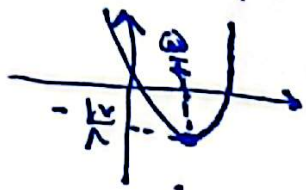
$$\rightarrow (y-v)(y+1) \geq 0$$

$$\begin{array}{c} -1 \quad v \\ \hline + \quad - \quad + \end{array}$$

$$\boxed{R_f = (-\infty, -1] \cup [v, \infty)}$$

$$\omega_1) \dot{e}_{xt} = \frac{-6}{\sqrt{a}} = \frac{\omega}{\sqrt{a}}$$

$$\rightarrow \gamma\left(\frac{\omega}{\sqrt{a}}\right)^2 - \omega\left(\frac{\omega}{\sqrt{a}}\right) + 1 = -\frac{1}{\sqrt{a}}$$



$$\rightarrow R_f = \left[-\frac{1}{\sqrt{a}}; +\infty\right)$$

$$\omega_2) \frac{-6}{\sqrt{a}} = \frac{-4}{-\sqrt{a}} \rightarrow \frac{4}{\sqrt{a}} \rightarrow -\left(\frac{4}{\sqrt{a}}\right)^2 + 4\left(\frac{4}{\sqrt{a}}\right) - \omega = 1$$

$$R_f = \left[-\infty; +\infty\right) \rightarrow R_f = \left[-\infty; +\infty\right) \rightarrow R_f = \left[-\infty; +\infty\right) = \left[0; +\infty\right)$$

$$\omega_3) R_f = \left[-\infty; +\infty\right) \rightarrow \left[0; +\infty\right)$$

$$>) \log(-\infty; +\infty) \rightarrow \log(0; +\infty) \rightarrow \mathbb{R} = R_f$$

$$\omega_1) R_f = \mathbb{R} - \left\{\frac{a}{c}\right\} \Rightarrow R_f = \mathbb{R} - \left\{\frac{1}{\sqrt{a}}\right\}$$

$$\omega_2) R_f = \mathbb{R} - \left\{1\right\} = \left[0; +\infty\right) - \left\{1\right\}$$

$$\omega_3) \frac{x^2 + x + 1}{\sqrt{x^2 + 1}} = \frac{x^2 + x}{\sqrt{x^2 + 1}} + \frac{1}{\sqrt{x^2 + 1}} = \sqrt{x^2 + 1} + \frac{1}{\sqrt{x^2 + 1}}$$

$$\rightarrow x=0 \rightarrow \sqrt{1} + \frac{1}{\sqrt{1}} = \frac{2}{\sqrt{1}} \Rightarrow R_f = \left[\frac{2}{\sqrt{1}}; +\infty\right)$$

$$>) x^2 + x + 1 + \frac{1}{\sqrt{x^2 + 1}} \rightarrow x^2 + x + 1 + \frac{1}{\sqrt{x^2 + 1}} - 1$$

$$\xrightarrow{x=0} \frac{1}{\sqrt{1}} \rightarrow R_f = \left[\frac{1}{\sqrt{1}}; +\infty\right) \Rightarrow R_f = \left[\frac{1}{\sqrt{1}}; +\infty\right)$$

روش اول  $\rightarrow yx^2 - y = rx^2 + r$

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$$yx^2 - rx^2 = y + r$$

$$\rightarrow x^2(y - r) = y + r$$

$$\rightarrow x^2 = \frac{y+r}{y-r} \rightarrow \frac{y+r}{y-r} > 0$$



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

روش دوم  $\rightarrow 0 < x^2 < \infty$

- $x^2 = 0 \rightarrow -r$
- $x^2 = +\infty \rightarrow y$
- $x^2 \neq 1 \rightarrow x \neq \pm 1$

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

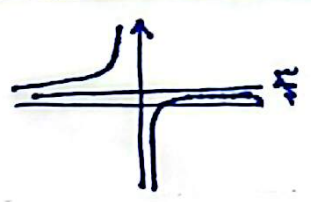
$-1 < \sin x < 1$

- $\sin x = -1 \rightarrow \frac{r(-1)+r}{-1-r} = -\frac{1}{r}$
- $\sin x = 1 \rightarrow \frac{r(1)+r}{1-r} = -r$

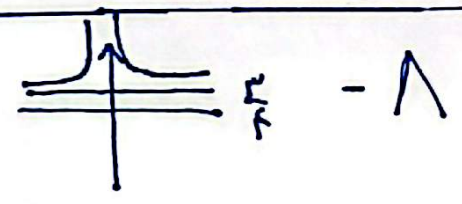
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$$R_f = [-r, -\frac{1}{r}]$$

و)  $\frac{rx-1}{rx}$

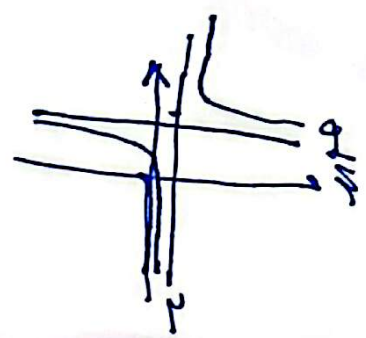


$$\rightarrow \left| \frac{rx-1}{rx} \right|$$



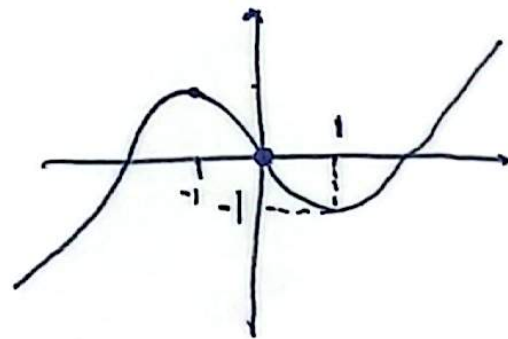
$$R_f = (\frac{r}{r} + \infty)$$

و)  $\frac{rx-1}{-1+rx}$



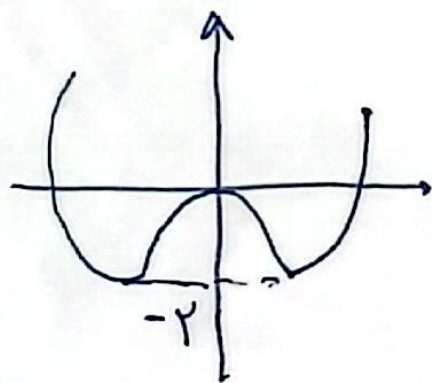
$$R_f = \sqrt{1R - \frac{1}{r}} \cup ([0, +\infty) - \{\frac{r}{r}\})$$

$$\begin{cases} x^2 - 2x & x \geq 0 \\ -x^2 - 2x & x < 0 \end{cases}$$



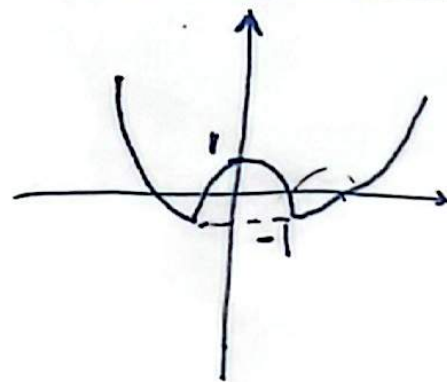
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$$R_f = \mathbb{R}$$



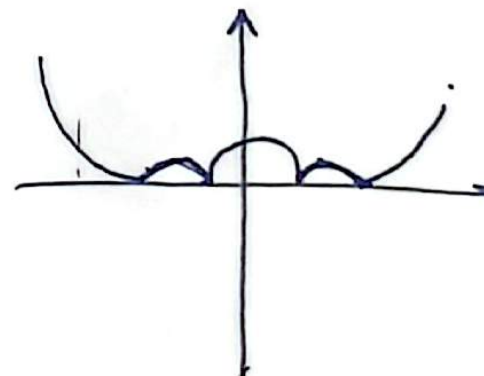
$$f(|x|)$$

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



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

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



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

$$R_f = [0, +\infty)$$

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