

الف) $y = \frac{|x|+1}{|x|-2}$

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الف) $y = \frac{|x|+1}{|x|-2}$ $\begin{cases} \max \rightarrow 1 \\ \min \rightarrow -\frac{1}{2} \end{cases}$ $\Rightarrow R_f = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$

(2) -1

ب) $y = \frac{x^2+1}{|x|} \rightarrow |x| + \frac{1}{|x|} \Rightarrow R_f = [1, +\infty)$

$y = \frac{x^2+2x-2}{x+2} \rightarrow 2y \neq y = x^2+2x-2 \Rightarrow x^2+(2-y)x-2-y = 0$

$\Rightarrow x = \frac{y-2 \pm \sqrt{y^2-4y+4+4y+4}}{2} \Rightarrow y^2+4y+4 \geq 0 \Rightarrow (y+2)^2 \geq 0$

$\Rightarrow R_f = (-\infty, -2] \cup [-2, +\infty)$

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

(1, 5) 1, 2

$x = \frac{1}{x} \rightarrow \left[\frac{1}{x}, +\infty\right) \Rightarrow \frac{1}{x^2-x+1} \rightarrow R_f = (0, 1]$

$\Rightarrow 1 - \frac{1}{x^2-x+1} \rightarrow R_f = [0, 1], R_f = \mathbb{R}$

راه حل صفتی آخر هم ببین

الف) $y = \sqrt{-2x^2+5x-1} = \sqrt{(-\infty, 2]} \rightarrow R_f = [0, \sqrt{2}]$

(2) 1, 2

ب) $y = \sqrt[3]{2x^2-11x} \Rightarrow \sqrt[3]{(-1, +\infty)} \Rightarrow R_f = [-2, +\infty)$

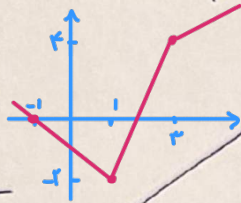
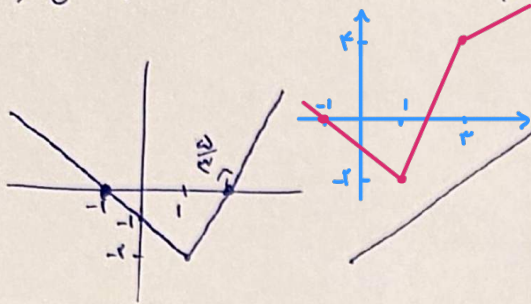
الف) $y = \log_2(x^2-2x+1) \rightarrow R_f = \mathbb{R} \Rightarrow \log_2(-\infty, +\infty) \rightarrow R_f = \mathbb{R}$

(2) 1, 2

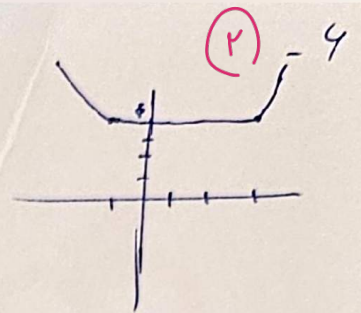
ب) $\log_2 \frac{x+1}{x} \rightarrow \log_2 \frac{x+1}{x} \xrightarrow{x \rightarrow 0} \log_2 \frac{1}{0} \rightarrow R_f = (1, +\infty)$

$x \rightarrow \infty \rightarrow \log_2(-\infty, -2] \rightarrow$ تعریف نشده

الف) $y = |2x-2| - |2-x| \rightarrow R_f = [-2, +\infty)$

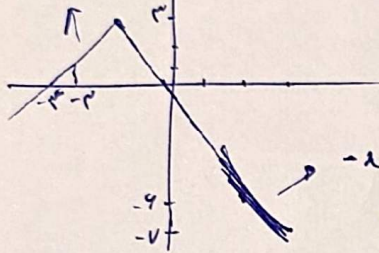


$\rightarrow y = |2-x| + |2+x|$
 $R_f = (-\infty, +\infty)$



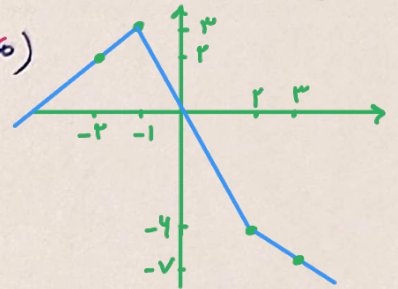
$|2-x| - |2x+2| \leq 1$

$-x + 2 + 2x + 2 \leq 1 \Rightarrow x \leq -2$

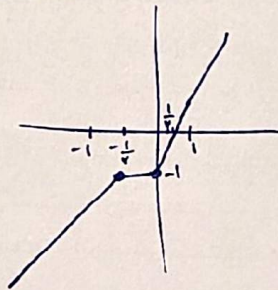


$-x + 2 - 2x - 2 \leq 1$
 $\Rightarrow x \geq -\frac{1}{2}$

$\Rightarrow R_f = (-\infty, -2] \cup [-\frac{1}{2}, +\infty)$



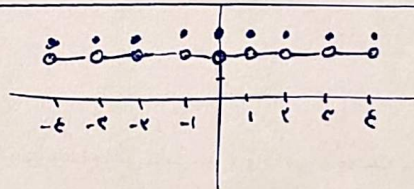
$3x - |2x+1| + |x|$



$\Rightarrow R_f = \mathbb{R}$

د) $y = [x] + [x-2] = [x] + [-2] + 2$

$\Rightarrow R_f = \{1, 2\}$



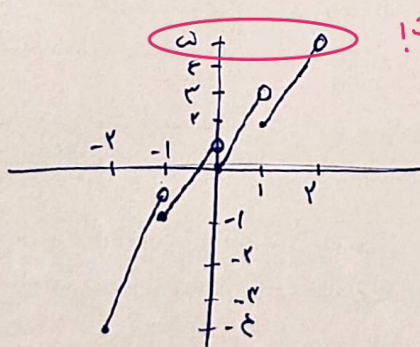
ب) $3x - [x]$

$0 \leq x < 1 \rightarrow 3x$

$1 \leq x < 2 \rightarrow 3x-1$

$-1 \leq x < 0 \rightarrow 3x+1$

$x \leq -1 \rightarrow 3x+2$



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

الف) $y = \sin^2 x - \cos x + 1 \xrightarrow{1 \leq \cos x \leq 2} -\frac{b}{4a} \rightarrow \frac{1}{4} \Rightarrow R_f = [\frac{1}{4}, 2]$

ب) $y = \sin^2 x + \sin x + 1 \xrightarrow{0 \leq \sin x \leq 1} -\frac{b}{4a} \rightarrow -\frac{1}{4} \Rightarrow R_f = [1, 2]$

۳- مخرج کسر همواره مثبت است پس دامنه IR است

$$f(x) = \frac{(x - \frac{1}{4})^2}{(x - \frac{1}{4})^2 + \frac{3}{4}}$$

طرفین درمیان $\rightarrow yx^2 - yx + y = x^2 - x + \frac{1}{4} \rightarrow (y-1)x^2 - (y-1)x + y - \frac{1}{4} = 0$

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

$$\frac{0}{-} \mid \frac{1}{+} \Rightarrow y = [0, 1]$$

ضریب x^2 نباید صفر شود یعنی $y \neq 1$ است

و تابع در انزای هیچ مقداری برابر یک نمیشود پس برد برابر است با: $Ry = [0, 1)$

میتوانستیم از روش مربع هم استفاده کنیم:

$$f(x) = \frac{\square^2}{\square^2 + \frac{3}{4}}$$