

الف) $y = \frac{\ln|t+1|}{\ln|t-2|} \Rightarrow t = |t| \Rightarrow t \geq 0, t \neq 2$

$y = \frac{t+1}{t-2} \Rightarrow y(t-2) = t+1 \Rightarrow t(y-1) = 2y+1$

$\Rightarrow t = \frac{2y+1}{y-1} \quad t \geq 0 \Rightarrow \frac{2y+1}{y-1} \geq 0$
 $\Rightarrow R_f = [-\frac{1}{2}, 1) \cup (1, +\infty)$

ب) $y = \frac{\ln^2 t + 1}{\ln t} \Rightarrow \ln t < 0$

$y = \frac{\ln^2 t + 1}{\ln t} \Rightarrow \ln t + \frac{1}{\ln t} \Rightarrow t \ln t > 0 \Rightarrow y = t + \frac{1}{t}$
 $t + \frac{1}{t} \geq 2 \Rightarrow R_f = [2, +\infty)$

$y = \frac{\ln^2 t + 2\ln t - 2}{\ln t + 2} \Rightarrow \ln^2 t + 2\ln t - 2 = y(\ln t + 2)$

$\Rightarrow \ln^2 t + (2-y)\ln t - (2+2y) = 0 \Rightarrow \Delta = (2-y)^2 - 4(2+2y) \geq 0$

$\Rightarrow y^2 + 4y + 12 \geq 0 \Rightarrow (y+2)(y+6) \geq 0$

$R_f = (-\infty, -6) \cup [-2, +\infty)$

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

$\ln^2 t - \ln t + 1 \neq 0 \Rightarrow \Delta = 1 - 4(1)(1) = -3$
 $\Delta = -3 < 0 \Rightarrow D_f = \mathbb{R}$

حاصل

$R_f \quad y(\ln^2 t - \ln t + 1) = \ln^2 t - \ln t + \frac{1}{t} \Rightarrow (y-1)(\ln^2 t - \ln t) = \frac{1}{t} - y$

$\Rightarrow \frac{1}{t} - y = \ln^2 t - \ln t \Rightarrow \ln^2 t - \ln t - \frac{1}{t} + y = 0$

$\Delta \geq 0 \quad 1 + 4(\frac{1}{t} - y) \geq 0 \quad \frac{y}{y-1} \geq 0 \Rightarrow y > 1 \text{ or } y < 0$

$\ln^2 t - \ln t + \frac{1}{t} \geq (\ln t - \frac{1}{t})^2 \geq 0 \Rightarrow y \geq 0 \Rightarrow y = 0 \text{ or } y > 1$

$(\ln^2 t - \ln t) = t$
 $\Rightarrow y = \frac{t+1}{t+1}$

$R_f = [0, 1)$

برآز با بیس من خودی

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الف) $y = \sqrt{-x^2 + 4x - 1}$

$-x^2 + 4x - 1 = 3 - (x-2)^2 \xrightarrow{(x-2)^2 \geq 0} \text{زیر اداگان} \text{ } x = 3$

$\sqrt{} \Rightarrow 0 \leq y \leq \sqrt{3}$ $\text{زیر اداگان}^{\min} = 0$

$R_f = [0, \sqrt{3}]$

ب) $\sqrt{2x^2 - 8x}$

$2x^2 - 8x = 2(x^2 - 4x) = 2(x-2)^2 - 8$

$(x-2)^2 \geq 0 \Rightarrow 2(x-2)^2 - 8 \geq -8 \xrightarrow{\sqrt{}} R_f = [-2, +\infty)$

عبارت زیر اداگان $[-8, +\infty)$

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الف) $y = \log(x^2 - x + 18)$

$x^2 - x + 18 > 0$

تابع درجه ۳ است
و از $-\infty$ تا $+\infty$
همواره مثبت است
دلیل: هر اعداد حقیقی را می‌گیرد



$R_f = \mathbb{R}$

ب) $y = \log_r \left(\frac{x^2+1}{x} \right)$

$\frac{x^2+1}{x} = x + \frac{1}{x} \xrightarrow{\text{طبق شرط و لایب}} x + \frac{1}{x} > 0$

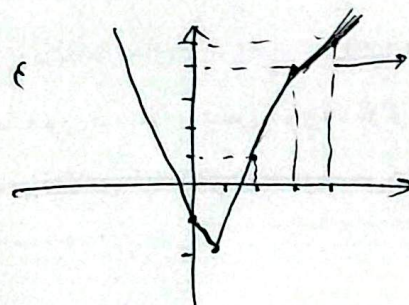
$x + \frac{1}{x} \geq 2 \Rightarrow \frac{x^2+1}{x} \in [2, +\infty)$

بنابراین $\log_r \left(\frac{x^2+1}{x} \right) \geq \log_r 2$
 $\log_r +\infty = +\infty$

$R_f = [1, +\infty)$

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الف) $y = |2x-2| - |x-5|$
 $x=0 \quad x=1 \quad x=2 \quad x=3 \quad x=4$

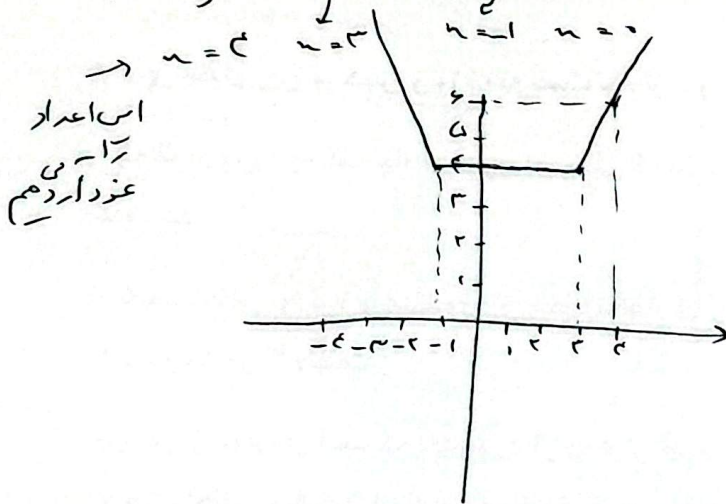


کمی
غیر
کج
در
بالای

$R_f = [-2, +\infty)$

این اعداد
را به نمودار
میدهم

ب) $y = |n-3| + |n+1|$



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

-V

$$n < -1 \Rightarrow (2-n) - (2n+2) \leq 1 \Rightarrow n+2 \leq 1$$

$$\Rightarrow \boxed{n \leq -2}$$

$$-1 \leq n < 2 \Rightarrow (2-n) - (2n+2) \leq 1 \Rightarrow -3n \leq 1 \Rightarrow n \geq -\frac{1}{3}$$

$$\Rightarrow \boxed{-\frac{1}{3} \leq n \leq 2}$$

$$n \geq 2 \Rightarrow (n-2) - (2n+2) \leq 1 \Rightarrow -n-4 \leq 1 \Rightarrow$$

$$n \geq -5 \Rightarrow \boxed{n \geq 2}$$

$$\boxed{\text{جواب: } (-\infty, -2] \cup [-\frac{1}{3}, +\infty)}$$

$$y = 3n - |2n+1| + |n|$$

$$n < -\frac{1}{2} \Rightarrow y = 3n + (2n+1) - n = 4n+1$$

مقادیر

$(-\infty, -1)$

-A

$$-\frac{1}{2} \leq n < 0 \Rightarrow y = 3n - (2n+1) - n = -1$$

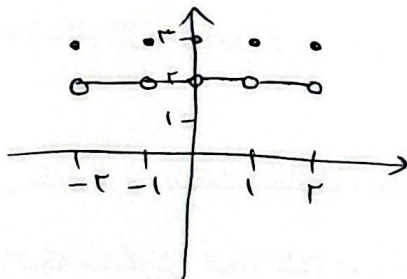
$$n \geq 0 \Rightarrow y = 3n - (2n+1) + n = 2n-1$$

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

مقادیر

$$\boxed{R_f = \mathbb{R}}$$

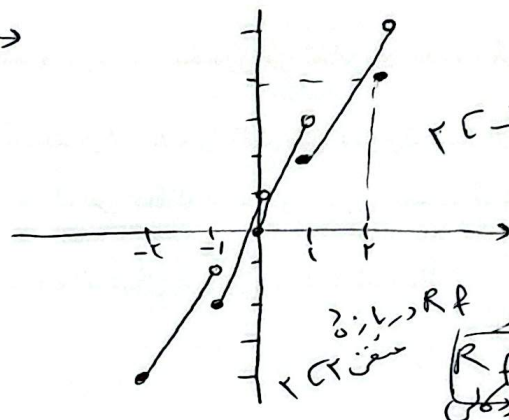
الف) $y = [n] + [r-n]$



$R_f = \{1, 2\}$

ب) $y = r_n - [n]$

$$\begin{cases} r_n + 1 \leq n < -1 \\ r_n + 1 - 1 \leq n < 0 \\ r_n & 0 \leq n < 1 \\ r_n - 1 + 1 \leq n < 2 \\ r_n & n = 2 \end{cases}$$



$R_f = [-\epsilon, 0]$

$R_f = \mathbb{R}$

الف) $y = \sin^2 n - \sin n + 1$

$\sin n = 1 \quad 1 - 1 + 1 = 1$

$\sin n = -1 \quad 1 - (-1) + 1 = 3 \text{ max}$

$\sin n = \frac{-b}{2a} = \frac{1}{2} \quad \frac{1}{2} - \frac{1}{2} + 1 = \frac{3}{2} \text{ min}$

$R_f = [\frac{3}{2}, 3]$

ب) $y = \sin^2 n + \sin^2 n + 1$

$y = (\sin^2 n) + \sin^2 n + 1$

$\sin^2 n = 1 \quad 1 + 1 + 1 = 3 \text{ max}$

$\sin^2 n = 0 \quad 0 + 0 + 1 = 1 \text{ min}$

$\sin^2 n = \frac{-b}{2a} = \frac{-1}{2} \notin [0, 1]$

$R_f = [1, 3]$