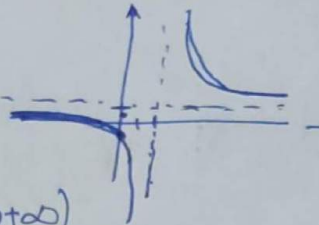
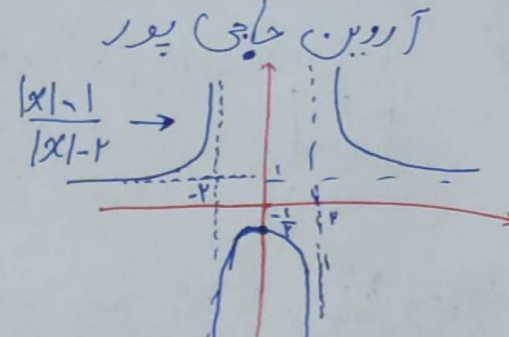
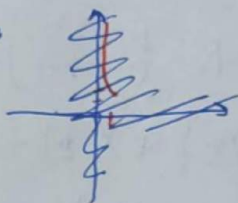


الف $y = \frac{|x|-1}{|x|-2} \rightarrow \frac{x-1}{x-2}$  $\Rightarrow Rf = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$

آر وین حاجی پور 

ب: $\frac{x^2-1}{|x|} \rightarrow \frac{x^2-1}{x}$  $Rf = [2, +\infty)$

راه حل تست هم داره بجز رسم مرحله مرحله

$\frac{x^2-1}{|x|} = \frac{|x|^2-1}{|x|} = |x| - \frac{1}{|x|} \Rightarrow |x| - \frac{1}{|x|} \geq 2$

$y = \frac{x^2-2x-2}{x+3} \Rightarrow x^2-2x-2 = y(x+3) \Rightarrow x^2 - (2+y)x - (2+3y) = 0$

$\Rightarrow x = \frac{-(2+y) \pm \sqrt{(2+y)^2 + 4(2+3y)}}{2} \Rightarrow y^2 + 8y + 12 \geq 0$

$\Rightarrow (y+4)(y+3) \geq 0$

$\Rightarrow Rf = (-\infty, -4] \cup [-3, +\infty)$

الف: $-x^2-4x-1 \geq 0 \Rightarrow x^2+4x+1 \leq 0$

$\Delta = 16-4 = 12 \Rightarrow \sqrt{12} = 2\sqrt{3}$

$\Rightarrow x = \frac{-4 \pm 2\sqrt{3}}{2} = -2 \pm \sqrt{3}$

$\Rightarrow Rf = [-2-\sqrt{3}, -2+\sqrt{3}]$

ب: $2x^2-18x \rightarrow 2x(x-9) \Rightarrow \frac{0}{18-18} = 0$

$\min = -\frac{1}{-4} = \frac{1}{4} \Rightarrow Rf = [-1, +\infty) \Rightarrow [-2, +\infty)$

ج: $x^2-x-1 \neq 0 \Rightarrow Df = R$

$y = \frac{x^2-x-1}{x^2+x+1}$

$\Rightarrow (1-y)x^2 + (y-1)x - \frac{1}{1-y} - y = 0$

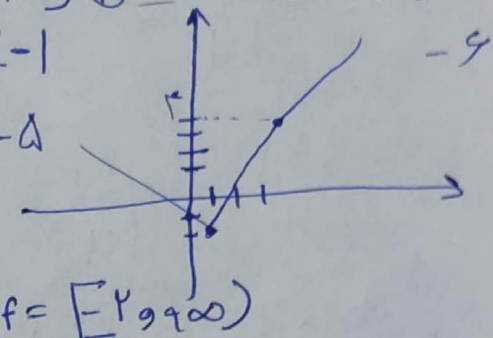
$\Rightarrow x = \frac{-(y-1) \pm \sqrt{(y-1)^2 + 4(\frac{1}{1-y} + y)}}{2(1-y)}$

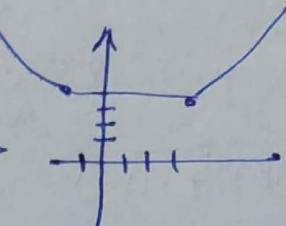
$\Rightarrow -3y^2 + 3y \geq 0 \Rightarrow y(1-y) \geq 0$

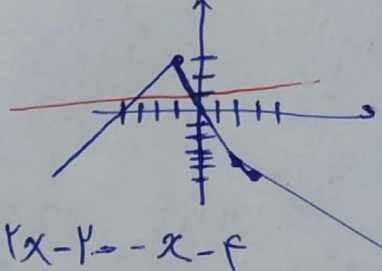
$\Rightarrow Rf = [0, 1]$

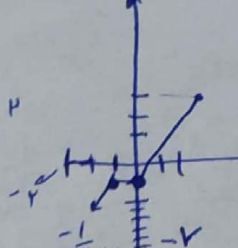
الف: $\log(x^3 - x + 1) \Rightarrow x^3 - x + 1 > 0 \Rightarrow x(x^2 - 1) > -1$
 $(x-1)(x+1)$
 $\hookrightarrow R = \mathbb{R}(-\infty, +\infty) \Rightarrow \log(-\infty, +\infty) \Rightarrow \log(0, +\infty)$
 $Rf = (-\infty, +\infty)$

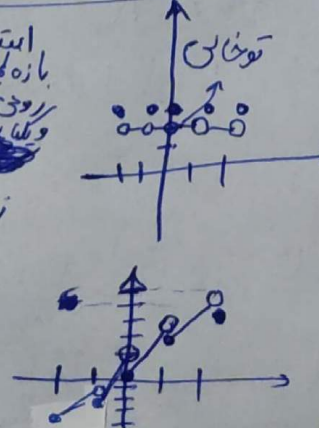
ب: $\log\left(\frac{x^2+1}{x}\right) > 0 \Rightarrow x > \frac{1}{x} \Rightarrow \textcircled{1} \Rightarrow \log[1, +\infty) \Rightarrow Rf = [1, +\infty)$
 $\hookrightarrow R = \mathbb{R}(-\infty, -1] \cup [1, +\infty) \textcircled{1}$

الف: $x \leq 1 \rightarrow -2x - 2 + x + 3 \rightarrow -x - 1$
 $3 > x > 1 \rightarrow 2x - 2 + x - 3 \rightarrow 3x - 5$
 $x \geq 3 \rightarrow 2x - 2 - x + 3 \rightarrow x + 1$

 $Rf = [2, +\infty)$

ب: $|x-3| + |x+1| \Rightarrow$  $\Rightarrow Rf = [4, +\infty)$

$|x-2| - |2x+2| \rightarrow$ 
 $x \geq 2 \rightarrow x - 2 - 2x - 2 = -x - 4$
 $x \leq -1 \rightarrow -x + 2 + 2x + 2 = x + 4 \rightarrow x = -4$
 $-1 > x > -2 \rightarrow -x + 2 - 2x - 2 = -3x = 1 \rightarrow x = -\frac{1}{3}$
 $\Rightarrow x > -\frac{1}{3}$
 $(-\infty, -3] \cup [-\frac{1}{3}, +\infty)$

نقطه گذاری: $-2, 0, -\frac{1}{3}, 2$

 $\Rightarrow Rf = (-\infty, +\infty)$

الف: -2 ابتدا و انتها بازه نقطه گذاری و کلاً اعداد صحیح
 $(-2, -1)$
 $[0, 1)$ نقطه گذاری
 $[1, 2)$
 2 نقطه گذاری

 $Rf = \{2, 3\}$
 $3x + 2 = -5 \Rightarrow 3x = -7 \Rightarrow x = -\frac{7}{3}$
 $3x - 1 = 0 \Rightarrow 3x = 1 \Rightarrow x = \frac{1}{3}$
 $3x = 0 \Rightarrow x = 0$
 $3x = 1 \Rightarrow x = \frac{1}{3}$
 $3x = 2 \Rightarrow x = \frac{2}{3}$
 $Rf = [1, 2)$

الف : $\sin^{\mu} - \sin^{\nu} \rightarrow \frac{\max_{\mu, \nu} -1}{+1} \Rightarrow \frac{-1}{+1} = -1$ $\Rightarrow \frac{\mu_{\max}}{\mu_{\min}} = \frac{1}{\frac{1}{\mu}} = \mu$

ب : $\sin^{\mu} + \sin^{\nu} \rightarrow \frac{\max_{\mu, \nu} +1}{+1} \Rightarrow \frac{+1}{+1} = +1$ $\Rightarrow \frac{\mu_{\max}}{\mu_{\min}} = \frac{1}{\frac{1}{\mu}} = \mu$

$\left[\frac{\mu}{\nu}, \mu \right]$

$\min = -\frac{b}{\mu} \rightarrow -\frac{1}{\mu} \rightarrow \frac{1}{\mu}$

$0 \rightarrow +1$

$1 \rightarrow \mu \rightarrow [1, \mu]$