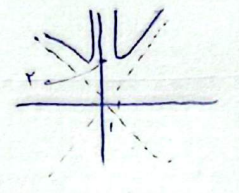


الف) $y = \frac{|n|+1}{|n|-2}$ $y \rightarrow |n| = \frac{-y-1}{y-1} = \frac{y+1}{y-1} \geq 0$ $\frac{-\frac{1}{y}}{+\frac{1}{y}-\frac{1}{y}+} \rightarrow R_F: (-\infty, \frac{1}{y}] \cup (1, +\infty)$

(۲)

$y = \frac{n^2+1}{|n|} \rightarrow \frac{n^2+1}{-n} \mid \frac{n^2+1}{n} = n \pm \frac{1}{n}$  $R_F: [2, +\infty)$

۱

$y = \frac{n^2+2n-2}{n+5} \rightarrow n^2+2n-2 = yn + 5y$
 $n^2+(2-y)n-2-5y=0 \rightarrow n = \frac{-(2-y) \pm \sqrt{\Delta}}{2} \rightarrow \Delta \geq 0$
 $(2-y)^2 + 4(2+5y) \geq 0$
 $y^2-4y+8+20y \geq 0 \rightarrow y^2+16y+8 \geq 0$
 $(y+2)(y+4) \geq 0$
 $R_F: (-\infty, -4] \cup [-2, +\infty)$

(۲)

۲

$f(n) = \frac{n^2-n+\frac{1}{\varepsilon}}{n^2-n+1}$ $D_F: n^2-n+1 \neq 0 \rightarrow D_F: \mathbb{R}$

(۲)

$\hookrightarrow \frac{(n-\frac{1}{\varepsilon})^2}{n^2-n+\frac{1}{\varepsilon}+\frac{\varepsilon}{\varepsilon}} = \frac{(n-\frac{1}{\varepsilon})^2}{(n-\frac{1}{\varepsilon})^2+\frac{\varepsilon}{\varepsilon}} = y \rightarrow (n-\frac{1}{\varepsilon})^2 = -\frac{\frac{\varepsilon}{\varepsilon}y}{y-1} = \frac{-\frac{\varepsilon}{\varepsilon}y}{y-1} \geq 0$ $R_F: [0, 1)$

۳

الف) $y = \sqrt{-n^2+8n-1} \rightarrow \frac{-\Delta}{\varepsilon_a} = \frac{-(14-8)}{-8} = 1.25$
 $R_F: [0, 1.25]$

(۲)

۲

ب) $y = \sqrt[n]{n^2-n} \rightarrow \min \left| \frac{-\Delta}{\varepsilon_a} : \frac{-4\varepsilon}{\Delta} = -1 \rightarrow \sqrt[n]{[-1, +\infty)} \Rightarrow R_F: [-2, +\infty)$

(۲)

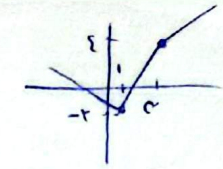
۱

الف) $y = f_y(\underbrace{n^2-n+1}_{R_F: \mathbb{R}}) = f_y^{\mathbb{R}} \mid R_F: \mathbb{R}$
 $(f_y(\cdot, \cdot)) \in \mathbb{R}$

$\rightarrow y = f_y(\frac{n^2+1}{n}) \rightarrow n \pm \frac{1}{n} \in (-\infty, -2] \cup [2, +\infty) \rightarrow f_y: [2, +\infty) \mid R_F: [1, +\infty)$

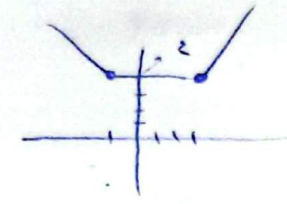
الف) $y = |2x-2| - |x-1|$

$-x+2+x-1$ $= -x+1$	$x-2+x-1$ $= x-3$	$x-2-x+1$ $= -x-1$
$-x$	x	x



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

ب) $y = |x-1| + |x+1|$

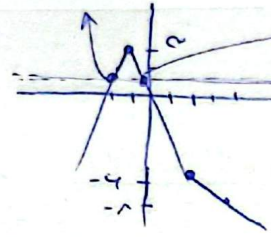


$R_f: [\varepsilon, +\infty)$

الف) $|x-2| - |x+2| \leq 1$

$x=2 \rightarrow y=-4$
 $x=\varepsilon \rightarrow 2-1=-1, y$
 $x=-1 \rightarrow y=3$
 $x=-2 \rightarrow 4-3=1$

$x+\varepsilon=1$
 $x=-\varepsilon$

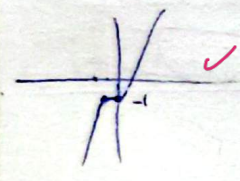


$-x+2+x+2$ $= x+4$	$-x+2-x-2$ $= -2x$	$x-2-x-2$ $= -x-4$
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$-2x=1$
 $x=-\frac{1}{2}$

جواب: $(-\infty, -\varepsilon] \cup [\frac{1}{\varepsilon}, +\infty)$

ب) $y = x - |x+1| + |x|$



$R_f: \mathbb{R}$

$x+x+1-x$
 $y = x+1$

$R_f: x \leq -\frac{1}{2}$
 $x \leq -2$
 $x+1 \leq -1$
 $(-\infty, -1]$

$-\frac{1}{2}$

$x-x-1-x$
 $= -1$
 $y = -1$

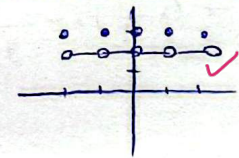
0

$x-x-1+x$
 $y = x-1$

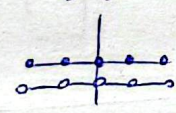
$R_f: x \geq 0 \rightarrow x, x-1 \geq -1$

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

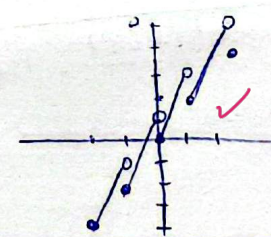
الف) $y = [x] + 2 + [-x] = [x] + [-x] + 2 =$



$R_y: \{2, 3\}$



برد مرخواستیم!



$R_y: [-1, 2)$

ب) $y = x - [x]$

$-2 \leq x < -1 \rightarrow [x] = -2; x+2$
 $-1 \leq x < 0 \rightarrow [x] = -1; x+1$
 $0 \leq x < 1 \rightarrow [x] = 0; x$
 $1 \leq x < 2 \rightarrow [x] = 1; x-1$
 $x=2 \rightarrow x-2$

الف) $y = \sin^2 x - \sin x + 1$

$\sin x = -1 \rightarrow y = 1 + 1 + 1 = 3$
 $\sin x = 1 \rightarrow 1 - 1 + 1 = 1$
 $\sin x = \frac{1}{2} \rightarrow \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4}$

$R_f: [\frac{3}{4}, 3]$

ب) $y = \sin^2 x + \sin x + 1$

$\sin x = 0 \rightarrow y = 1$
 $\sin x = 1 \rightarrow y = 3$
 $\sin x = -\frac{1}{2} \rightarrow \frac{1}{4} - \frac{1}{2} + 1 = \frac{3}{4}$

$R_f: [1, 3]$