

$$a) y, \frac{|a|+1}{|a|-1} \rightarrow y, \frac{-y-1}{y-1} = \frac{y+1}{y-1}$$

$$|a| = \frac{y+1}{y-1} \geq 0 \rightarrow \frac{-\frac{1}{y} + 1}{1 - \frac{1}{y}} + \rightarrow R_f = \mathbb{R} - \left(-\frac{1}{y}, 1\right]$$

$$\rightarrow y, \frac{a^r+1}{|a|} = \frac{|a|^r+1}{|a|}$$

$$|a| + \frac{1}{|a|} = |a| \geq 0$$

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

$$y, \frac{a^r+1}{a+r}$$

$$\rightarrow ay + ry = a^r + r a - r \rightarrow a^r + a(r-y) - r = ry$$

$$a = \frac{-(r-y) \pm \sqrt{(r-y)^2 + r(r+y)}}{r} \rightarrow \sqrt{r^2 + 4ry + 1}$$

$$\sqrt{r^2 + 4ry + 1} \geq 0 \rightarrow (y+y)(y+r) \geq 0 \rightarrow \frac{-y-r}{1-\frac{1}{y}} + \rightarrow R_f = \mathbb{R} - (y, r)$$

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

$$a^r - a + 1 = 0 \rightarrow \Delta < 0 \rightarrow a^r - a + 1 \neq 0$$

$$D_f = \mathbb{R} \quad y a^r - a y + y a^r - a + \frac{1}{r}$$

$$a^r(1-y) + a(y-1) + \frac{1}{r} - y \rightarrow a = \frac{1-y \pm \sqrt{(y-1)^2 - r(\frac{1}{r} - y)}}{r(1-y)}$$

$$-ry^r + ry \geq 0 \rightarrow \frac{0}{1-\frac{1}{y}} + \rightarrow R_f = [0, 1)$$

$$a) y, \sqrt{-a^r + r a - 1} \rightarrow \frac{-b}{r_1} = \frac{-r}{-r} = r, y = r$$

$$\rightarrow R_f = (-\infty, r]$$

$$\sqrt{(-\infty, r]} \cup [0, \sqrt{r}] = R_f$$

$$\rightarrow y, \sqrt{a^r - 1} a$$

$$\frac{-b}{r_2} = \frac{1}{r} = r \rightarrow y = -1$$

$$R_f = [-1, +\infty) = \sqrt{[-1, +\infty)}$$

$$= [-r, +\infty) \subset R_f$$

$$a) y = \log(a^r - a + 1)$$

$$\log(\mathbb{R}) = \log(0, +\infty) = (-\infty, +\infty) = \mathbb{R}$$

$$R_f = \mathbb{R}$$

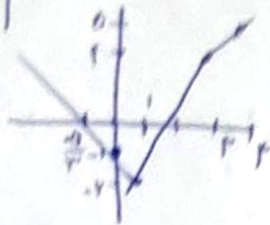
$$\rightarrow y, \log\left(\frac{a^r+1}{a}\right), \log\left(a + \frac{1}{a}\right)$$

$$a + \frac{1}{a} \rightarrow D_f = (-\infty, -r] \cup [r, +\infty)$$

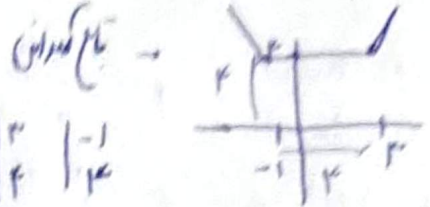
$$\log_r [r, +\infty) = \log_r r = 1 \rightarrow [1, +\infty) \subset R_f$$

الف) $y = |x - r| - |x - r|$

$\begin{vmatrix} 1 & 1 & 1 & 1 \\ -r & r & r & r \end{vmatrix}$



ب) $y = |x - r| + |x + 1|$



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

$R_f = [r, +\infty)$

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

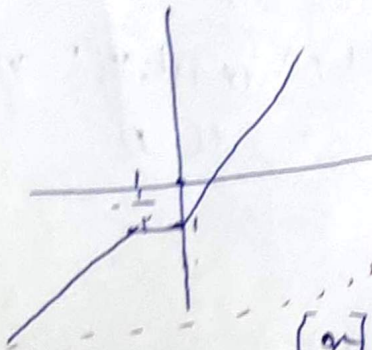
$$\begin{array}{c|c|c} -1 & r & \\ \hline x - r + x + 1 \leq 1 & x - r - x - 1 \leq 1 & x - r - x - 1 \leq 1 \\ x \leq -r & x \geq -\frac{1}{r} & x \geq 0 \end{array}$$

$\textcircled{1} \cap \textcircled{2}, \cup \textcircled{3} = [-\frac{1}{r}, +\infty) \cup (-\infty, -r]$

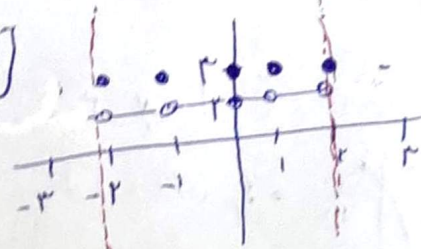
$y = r - |x + 1| + |x|$

$$\begin{array}{c|c|c} -\frac{1}{r} & 0 & \\ \hline r + x + 1 - x & r - x - 1 - x & r - x - 1 + x \\ r + 1 & -1 & r - 1 \end{array}$$

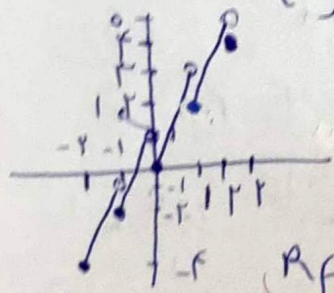
$R_f \subseteq \mathbb{R}$



الف) $[a] + [r - a] = y \rightarrow [a] + [-a] + r = y$



ب) $y = r - [a]$



$$\begin{array}{l} -r \leq a < -1 \rightarrow [a] = -r \rightarrow r - (-r) = 2r \\ -1 \leq a < 0 \rightarrow [a] = -1 \rightarrow r - (-1) = r + 1 \\ 0 \leq a < 1 \rightarrow [a] = 0 \rightarrow r - 0 = r \\ 1 \leq a < r \rightarrow [a] = 1 \rightarrow r - 1 \\ a = r \rightarrow [a] = r \rightarrow r - r = 0 \end{array}$$

$R_f = [-r, 0]$

الف) $y = \sin^2 x - \sin x + 1$

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

$$\begin{array}{l} \max = 1 \rightarrow 1 \\ \min = -1 \rightarrow r \end{array}$$