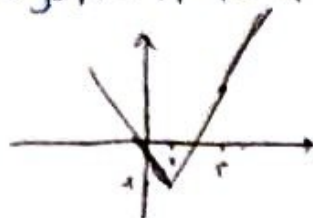


الف) $y = |x-r| - |x-r|$



$R = [-r, \infty)$

ب) $y = |x-r| + |x+1|$

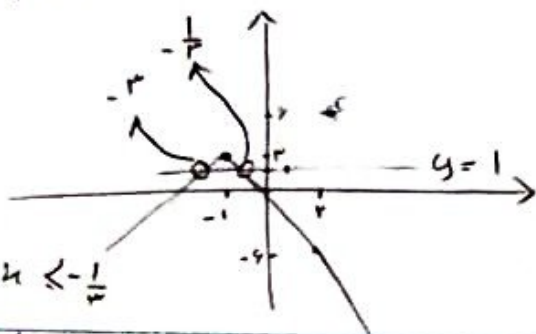


$R = [1, \infty)$

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

$-2r + x - x + r \leq 1$
 $x + 1 \leq 1 \sim x \leq -r$

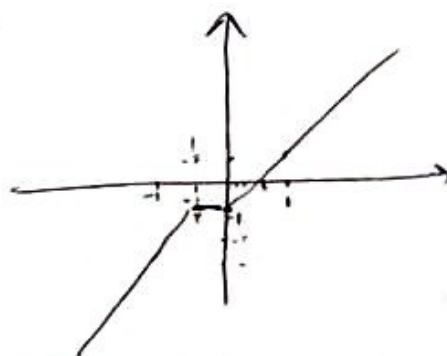
$x - r - x + r \leq 1$
 $x - r - x + r \leq 1 \sim x \leq -\frac{1}{r}$



$R = (-\infty, -r] \cup [-\frac{1}{r}, \infty)$

ج) $y = rx - |rx+1| + |x|$

$x - rx - 1 - x$	$rx - rx - 1 - x$	$rx - rx - 1 - x$
$rx + 1$	-1	$rx - 1$

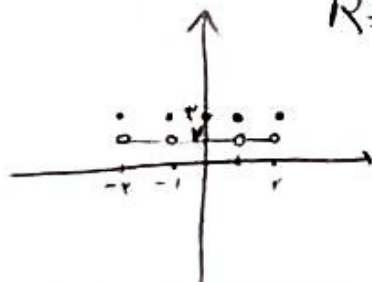


$R = \mathbb{R}$

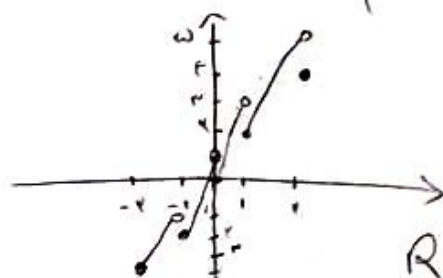
د) $y = [x] + [r-x]$

$y = [x] + [-x] + r$

$R = \{r, r\}$



ه) $y = rx - [x]$ $\begin{cases} rx & x \in \mathbb{Z} \\ rx - 1 & x \notin \mathbb{Z} \end{cases}$



$R = [-1, 0]$

و) $y = \sin^2 x - \sin x + \frac{1}{4}$

$\sin x = 1 \sim y = 1$

$\sin x = -1 \sim y = \frac{1}{4}$

$\sin x = \frac{1}{2} \sim y = \frac{1}{4}$

$R = [\frac{1}{4}, 1]$

ز) $y = \sin^2 x + \sin^2 x + 1$

$\sin x = 1 \sim y = 2$

$\sin x = 0 \sim y = 1$

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

$R = [\frac{3}{4}, 2]$

الف) $q = \frac{|x|+1}{|x|-1} \sqrt{y}$

ب) $q = \frac{x^2+1}{|x|}$

$R = [r, \infty)$



$Del = -\frac{-ry-1}{y^2-1} = \frac{ry+1}{y^2-1} \sim \frac{-\frac{1}{y}+1}{1-1} = \frac{-\frac{1}{y}+1}{0}$

$D = (-\infty, -\frac{1}{r}] \cup (1, \infty)$

$q = \frac{x^2+rx-r}{x+r} \xrightarrow{-1,+1} \frac{x^2+rx-r+1}{x+r} = \frac{(x+r)(x-1)+1}{x+r} = x-1 + \frac{1}{x+r}$

$\xrightarrow{+\frac{r}{x}-\frac{1}{x}} x+r+\frac{1}{x+r} - r \sim R = (-\infty, -r] \cup [-r, \infty)$

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

$D = x^2-x+1 \neq 0$

R

$\Delta = 1-4 = -3 < 0$

$D = \mathbb{R}$

$R = [0, \infty)$

$\left(\frac{x-\frac{1}{x}}{x^2-x+1} \right)^2 = y \sim yx^2 - yx + y = \left(x - \frac{1}{x} \right)^2$

$(y-1)x^2 + (-y+1)x + y - \frac{1}{x} = 0 \quad (y-1)^2 - 4(y-1)(y-\frac{1}{x}) \geq 0 \sim 1+y^2-4y+4(y-1-\frac{4}{x}y^2+y) \geq 0 \rightarrow 4(y+1) \geq 0$

الف) $q = \sqrt{-x^2+8x-1}$

ب) $q = \sqrt[3]{rx^2-11x}$

$\left| \frac{-\frac{1}{x}}{x} \right| \sim (-\infty, r]$

$\left| \frac{\frac{1}{x}}{x} \right| = r$

$\sim R = [-1, \infty)$

$\sim R = [0, \sqrt{8}]$

الف) $q = \log(x^2-x+11)$

ب) $q = \log_r \left(\frac{x^2+1}{x} \right) \sim$
 $\left(D = \frac{x^2+1}{x} > 0 \sim x > 0 \right)$

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

$x^2-x+11 \sim R = \mathbb{R}$

$\log \sim R$

$\Rightarrow R = \mathbb{R}$

$\log R = [r, \infty)$

$\sim y - R = [1, \infty)$