

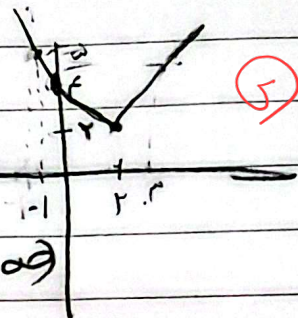
①

الف) $y = |x+2| + |x-4|$

$$\begin{cases} x+2 & x > 4 \\ -x-2 & x < -4 \\ -x+2 & -4 \leq x \leq 4 \end{cases}$$

$$\begin{array}{c|c} x < -4 & x > 4 \\ \hline x+2-2x & x+2x-4 \\ -x+2 & 3x-4 \end{array}$$

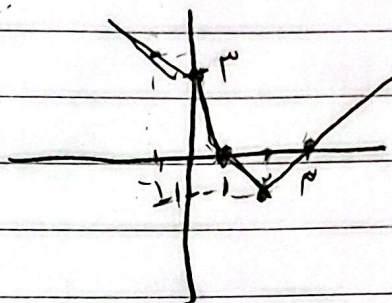
$R_y = [2, +\infty)$



ب) $y = |x-2| + |x-1| - |x|$

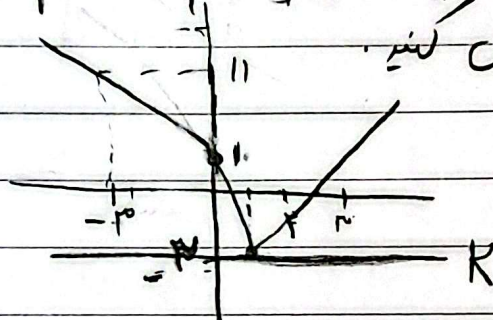
$$\begin{array}{c|c|c|c} x & 0 & 1 & 2 \\ \hline 3 & 0 & -1 & 2 \end{array}$$

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



② معادله $|x+2| - |x-3| = k$ یک ریشه دارد در این صورت مقدار k را مشخص کنید.

$$\begin{cases} 2x-5 & x > 1 \\ -x+1 & -2 \leq x \leq 1 \\ -2x+5 & x < -2 \end{cases}$$

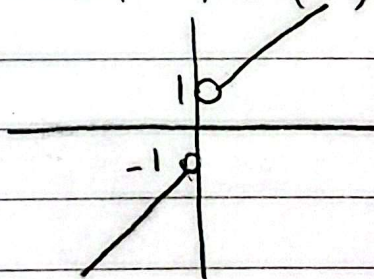


$k = -1$

الف) $x + \frac{x}{|x|}$

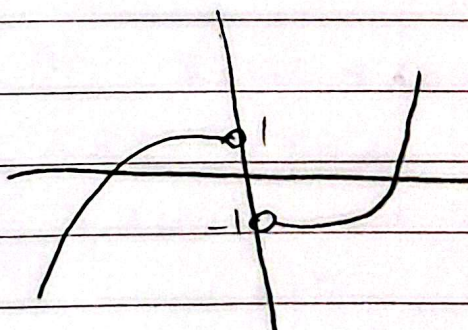
$D_f = \mathbb{R} - \{0\}$

$$\begin{cases} x+1 & x > 0 \\ x-1 & x < 0 \end{cases}$$



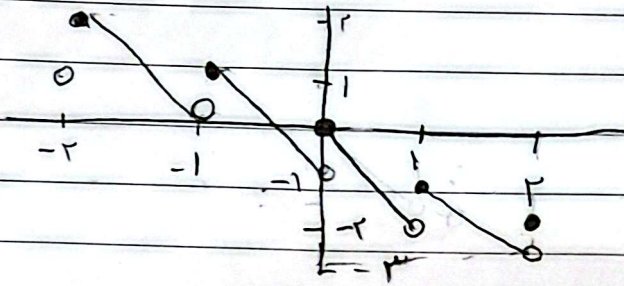
ب) $y = x|x| - \frac{x}{|x|}$

$$\begin{cases} x^2-1 & x > 0 \\ -x^2+1 & x < 0 \end{cases}$$



D _____ S _____

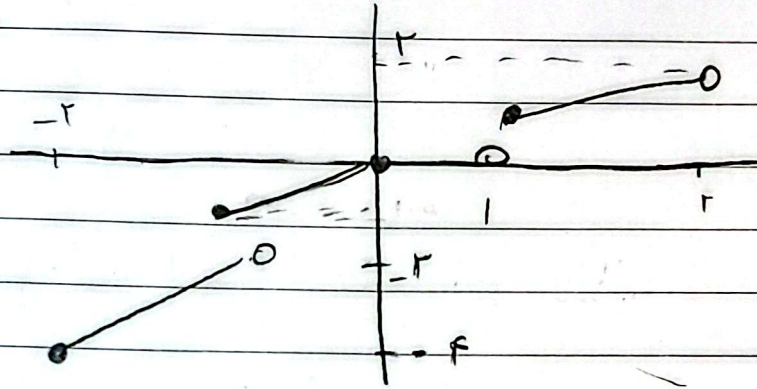
ii) $y = [n] - nx$



(F)

(5)

i) $[n] | n|$



(a)

ii) $y = nx - [nx] \text{ for } 0 \leq [nx] < 1, R_y = [0, 1)$

i) $y = nx - [nx] \rightarrow 0 \leq nx - [nx] < 1 \xrightarrow{\times \omega}, R_y = [0, 1)$

ii) $y = nx - \omega \left[\frac{n}{\omega} \right]$

$[0, 1)$

$\div \omega, y = \frac{nx}{\omega} - \left[\frac{n}{\omega} \right] \Rightarrow R_y = [0, \omega)$

i) $y = [nx] - nx$

$\rightarrow R_y = -1 < [nx] - nx < 0$

(9)

ii) $y = r \sin x + r \cos x$

$-\sqrt{r^2 + r^2} \leq r \sin x + r \cos x \leq \sqrt{r^2 + r^2}$

$-\sqrt{1^2 + 1^2} \leq \sin x + \cos x \leq \sqrt{1^2 + 1^2}$

$R_y = [-\sqrt{2}, \sqrt{2}]$

(1, \sqrt{2})

i) $y = r \sin x - r \cos x$

$-\sqrt{1^2 + 1^2} \leq r \sin x - r \cos x \leq \sqrt{1^2 + 1^2}$

$R_y = [-\omega, \omega]$

$$2) y = [r \sin \alpha + a \cos \alpha]$$

$$-\sqrt{a^2+r^2} \leq r \sin \alpha + a \cos \alpha \leq \sqrt{a^2+r^2}$$

$$R = [-\sqrt{a^2+r^2}, \sqrt{a^2+r^2}]$$

$$R_y = \{-a, -a-r, -r, -r, -1, 0, 1, r, r, a\}$$

$$1) y = \sqrt{a^2+r^2} \cos \alpha - r \sin \alpha \quad -\sqrt{1+r^2} \leq \cos \alpha - r \sin \alpha \leq \sqrt{1+r^2}$$

$$[-\sqrt{a^2+r^2}, \sqrt{a^2+r^2}] \rightarrow R_y = [0, \sqrt{a^2+r^2}]$$

$$a) y = \sin^2 \alpha + r \sin \alpha + r \quad -1 \leq \sin \alpha \leq 1$$

$$\sin \alpha = 1 \rightarrow y = 1$$

$$\sin \alpha = -1 \rightarrow y = 0 \quad R_y = [0, 1]$$

$$\frac{-b}{r a} = \frac{-r}{r} \rightarrow x = -1$$

$$b) y = r \sin^2 \alpha + r \sin \alpha + r \quad -1 \leq \sin \alpha \leq 1$$

$$\sin \alpha = 1 \rightarrow y = 1$$

$$\sin \alpha = -1 \rightarrow y = 0$$

$$R_y = [\frac{V}{1}, V]$$

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

$$c) y = \sin^2 \alpha + r \cos^2 \alpha$$

$$\sin^2 \alpha + r(1 - \sin^2 \alpha) = \sin^2 \alpha + r - r \sin^2 \alpha$$

$$= r - \frac{r \sin^2 \alpha}{[0, r]} \Rightarrow R_y = [1, r]$$

b)

$$y = \frac{r \cot^2 \alpha}{1 + \cot^2 \alpha} = \frac{r \cot^2 \alpha}{\frac{1}{\sin^2 \alpha}}$$

$$r \cot^2 \alpha \times \sin^2 \alpha = r \cos^2 \alpha \sin^2 \alpha = \sin^2 \alpha$$

$$-1 \leq \sin \alpha \leq 1 \rightarrow R_y = [-1, 1]$$

$$ii) y = \sin^2 x + \cos^2 x$$

(9)

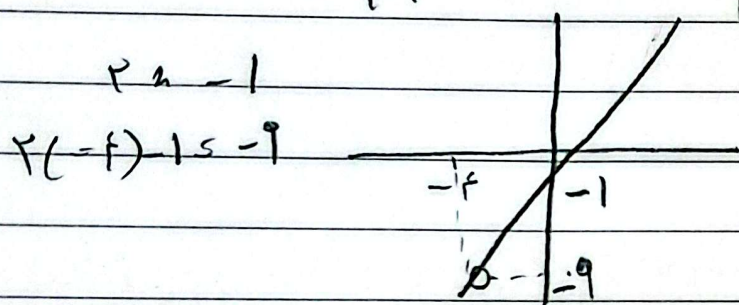
$$r^{1-r} \{ \sin^2 x + \cos^2 x \} \quad R_y = \left[\frac{1}{r}, 1 \right]$$

$$\rightarrow y = [\sin^2 x + \cos^2 x]$$

$$r^{1-r} \{ \sin^2 x + \cos^2 x \} \quad \underline{[]}, R_y = \{0, 1\}$$

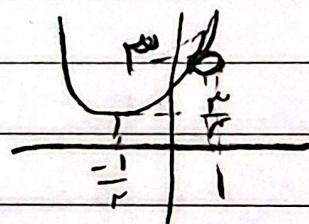
$$y = \frac{r^2 + 1}{r+1} = \frac{(r-1)(r+1)}{(r+1)}$$

(10)



$$R_y = \mathbb{R} - \{-1\}$$

$$\rightarrow \frac{r^2 - 1}{r-1} = \frac{(r-1)(r+1)}{(r-1)}$$



$$\frac{r^2 + r + 1}{(-1/r)^2 - 1/r + 1} = \frac{r}{r}$$

$$R_y = \left[\frac{1}{r}, +\infty \right)$$