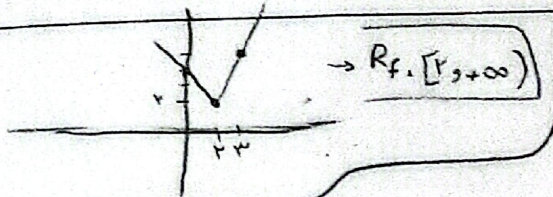


الف) $y = x + |x - 2|$

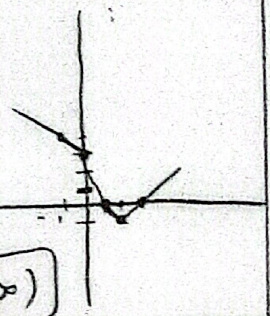
$$\begin{array}{r|l} x - 2 & x + 2 \\ \hline -x + 2 & x - 2 \end{array}$$



ب) $y = |x - 2| + |x - 1| - |x|$

$$\begin{array}{r|l} x & -x + 2 + x - 1 - x \\ \hline -x + 2 & -x + 2 + x - 1 - x \\ -x + 2 & -x + 2 + x - 1 - x \end{array}$$

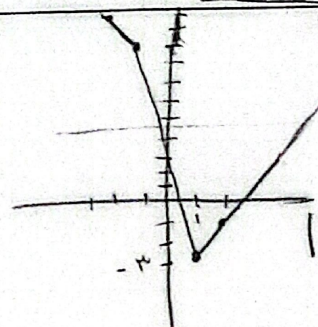
$R_f = [-1, +\infty)$



ج) $|x - 2| - |x + 2| = k$

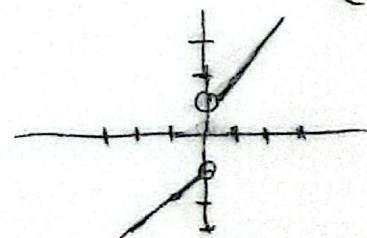
نقطه ها را در نظر بگیرید

$$\begin{array}{r|l} x - 2 & -x - 2 \\ \hline -x - 2 & x - 2 - x - 2 \\ -x - 2 & x - 2 - x - 2 \end{array}$$

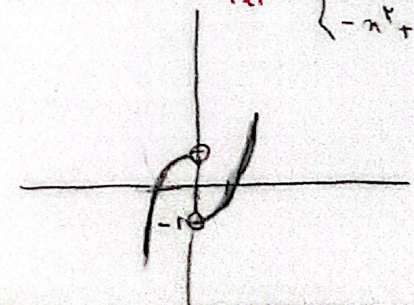


ک باید مقداری باشد که تساوی را با خود دارد داشته باشد پس آن نقطه است و $k = -3$

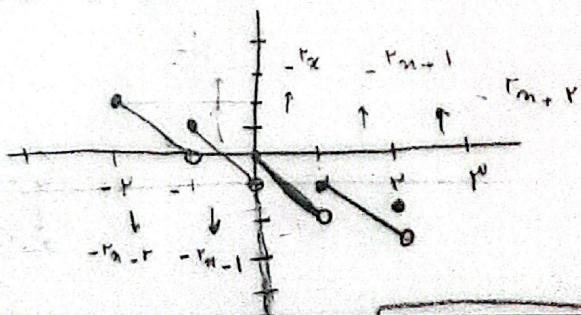
د) $y = x + \frac{x}{|x|} \rightarrow \begin{cases} x + 1 & x > 0 \\ x - 1 & x < 0 \end{cases}$



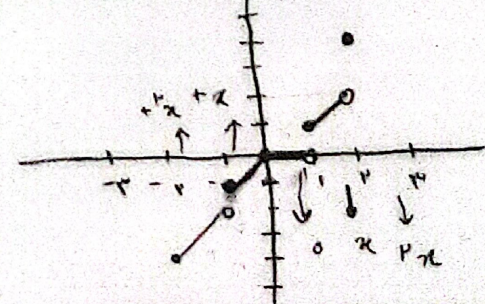
ه) $y = x|x| - \frac{x}{|x|} \rightarrow \begin{cases} x^2 - 1 & x > 0 \\ -x^2 + 1 & x < 0 \end{cases}$



و) $y = [x] - 2x$



ز) $y = [x]|x|$



ح) $y = x - [x] \rightarrow R_f = [0, 1)$

ط) $y = x - \varepsilon[x] \rightarrow \varepsilon(x - [x]) \rightarrow R_f = [0, \varepsilon)$

ث) $y = x - \omega[\frac{x}{\omega}] \rightarrow \omega(\frac{x}{\omega} - [\frac{x}{\omega}]) \rightarrow R_f = [0, \omega)$

ج) $[x] - 2x \rightarrow R_f = [-1, 0]$

1) $y = 4 \sin x + 3 \cos x$

$-\sqrt{4+9} \leq 4 \sin x + 3 \cos x \leq \sqrt{4+9}$

$Rf = [-5, 5]$

2) $y = 2 \sin x - 4 \cos x$
 $= 2 \sin x + (-4 \cos x)$

$-\sqrt{4+16} \leq 2 \sin x + (-4 \cos x) \leq \sqrt{4+16}$
 $Rf = [-2\sqrt{5}, 2\sqrt{5}]$

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

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

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

3) $y = \sqrt{\cos x - 4 \sin x} = \sqrt{\cos x + (-4 \sin x)}$
 $-\sqrt{1+16} \leq \cos x + (-4 \sin x) \leq \sqrt{1+16}$

$Rf = [-5, 5]$

1) $y = \sin^2 x + 4 \sin x + 4$

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

$\sin x = 1 \rightarrow y = 4$

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

$Rf = [0, 4]$

2) $y = r \sin^2 x + r \sin x + 1$

$\sin x = -1 \rightarrow y = 1$

$\sin x = 1 \rightarrow y = 4$

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

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

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

$\sin^2 x + 2 \cos^2 x = \sin^2 x + 2(1 - \sin^2 x) = 2 - \sin^2 x$

$Rf = [1, 2]$

2) $y = \frac{r \cos x}{1 + r \cos x} \rightarrow \frac{r \cos x}{\frac{1}{\sin x}} = r \cos x \sin x = \sin(2x)$

$Rf = [-1, 1]$

1) $y = \sin^4 x + \cos^4 x$

$\frac{1}{2} \leq \sin^4 x + \cos^4 x \leq 1$

$Rf = [\frac{1}{2}, 1]$

2) $y = [\sin^4 x + \cos^4 x]$

$\frac{1}{2} \leq \sin^4 x + \cos^4 x \leq 1$

$Rf = [\frac{1}{2}, 1]$

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

$(r n^2 + n - 2)(n+2) = (n+2)(r n - 1) \rightarrow y = (n+2)(r n - 1)$

$(n+2)(r n - 1) = r n^2 + 2 r n - n - 2 \rightarrow R = 12$

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

$y = n^2 + 1 + n \rightarrow S = \frac{n^2}{2}$

$Rf = [\frac{1}{2}, +\infty)$



$Rf = [12, 12]$