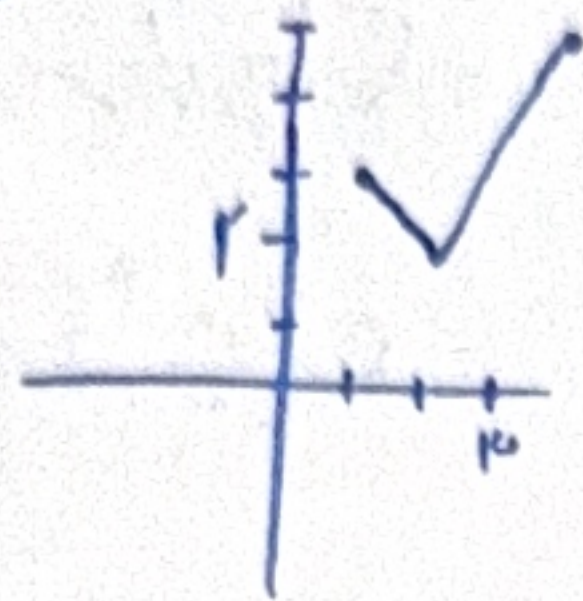


الف) $y = x + |x - 2|$

ضرایب

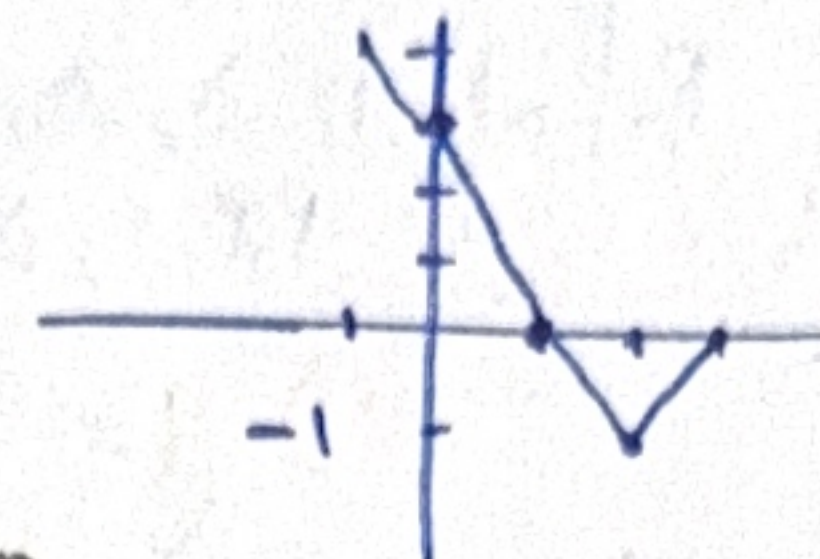
$$\begin{cases} x+2 & x > 2 \\ 2 & x = 2 \\ -x+2 & x < 2 \end{cases}$$



$RF = [2, +\infty)$

ب) $y = |x - 2| + |x - 1| - |x|$

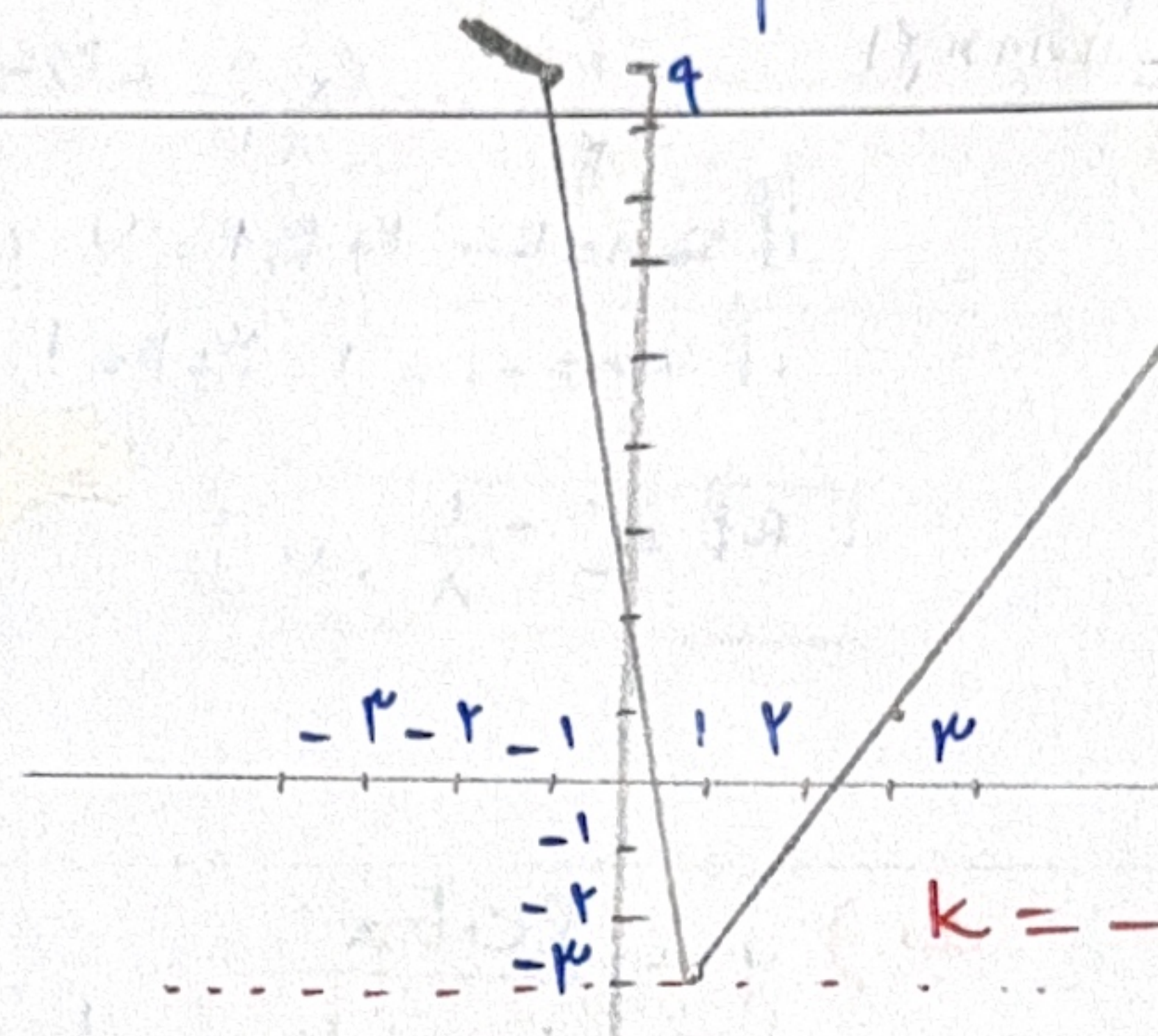
$$\begin{cases} -x+2-x+1+x & x < 1 \\ -x+2 & 1 \leq x < 2 \\ x-2+x-1-x & x \geq 2 \end{cases}$$



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

۱) $|x - 2| - |x + 2| = k$

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



$k = ? \leftarrow$ به چه مقدار

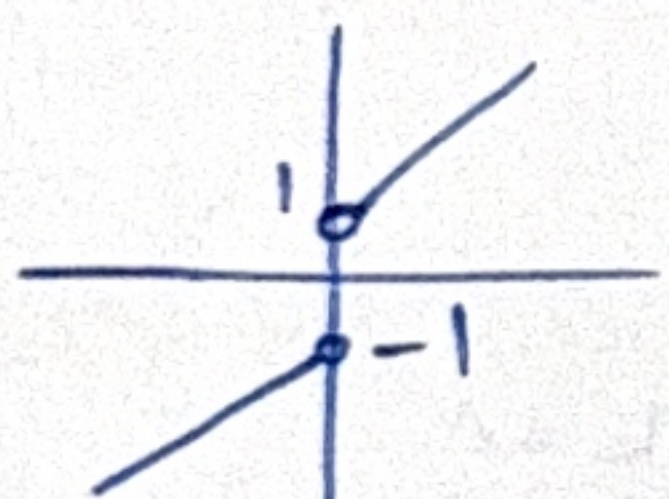
$y = -3$

$k = -3$

تکلیف غیر از این نیست

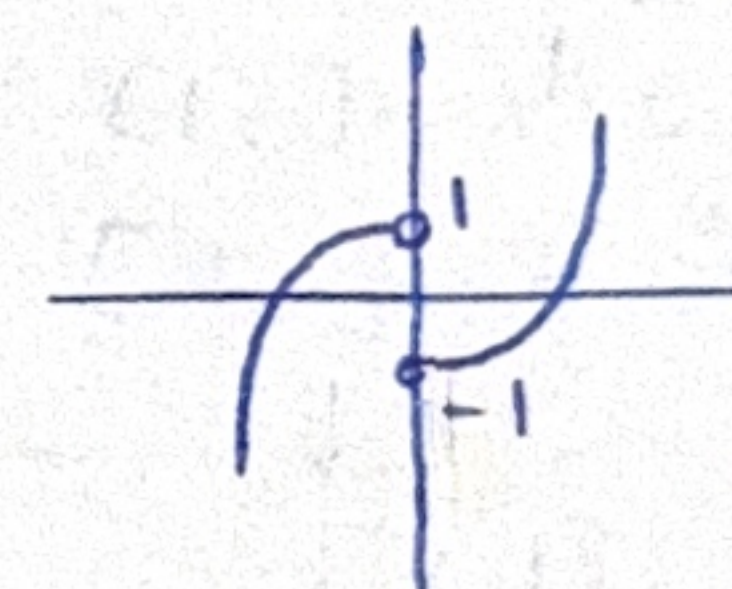
الف) $y = x + \frac{x}{|x|}$ $x \neq 0$

if $x > 0 \rightarrow x + \frac{x}{x} = x + 1 \rightarrow y = 1 \rightarrow 0$
if $x < 0 \Rightarrow x + \frac{x}{-x} = x - 1$ if $x = 0 \rightarrow y = -1$ $\rightarrow 0$



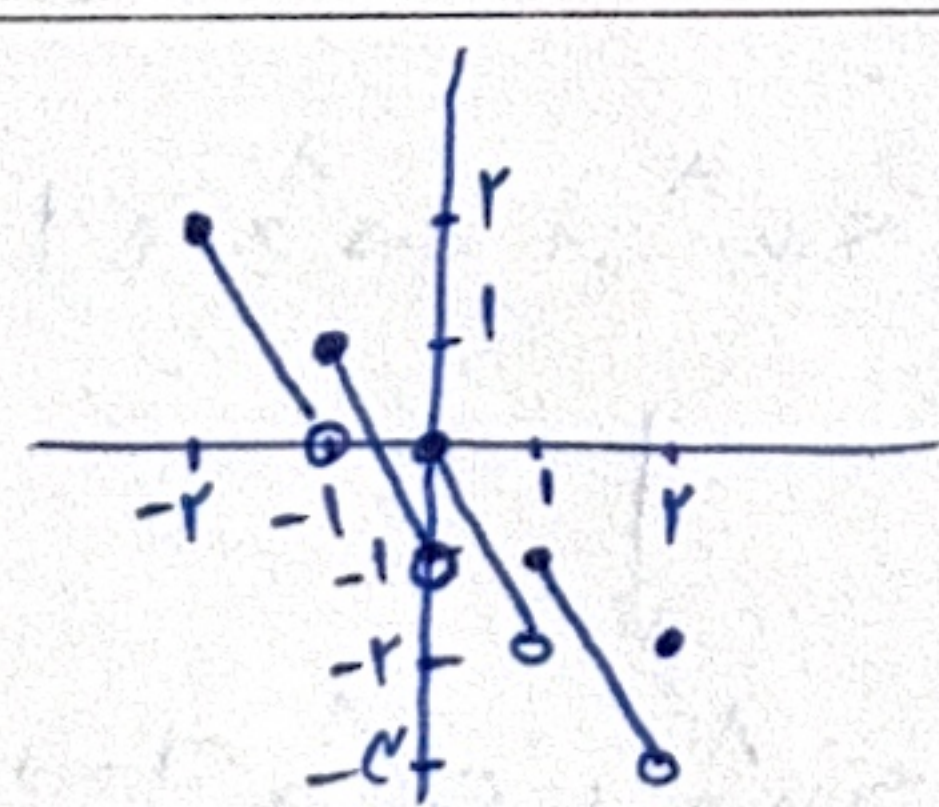
ب) $y = x|x| - \frac{x}{|x|}$

if $x > 0 \rightarrow x^2 - 1$
if $x < 0 \rightarrow -x^2 + 1$



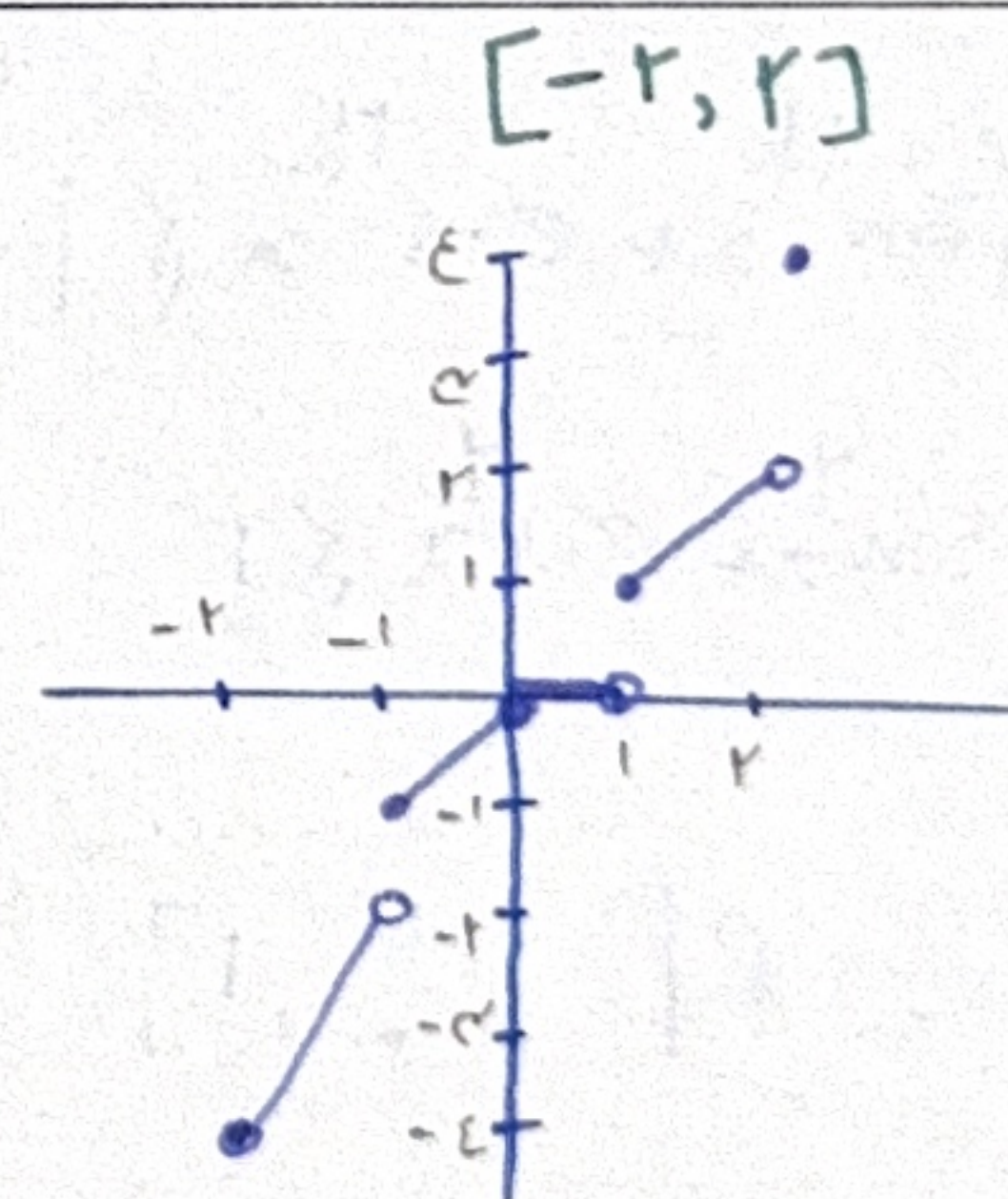
الف) $y = [x] - 2x$

$$\begin{cases} -2-2x & -2 \leq x < -1 \\ -1-2x & -1 \leq x < 0 \\ -2x & 0 \leq x < 1 \\ 1-2x & 1 \leq x < 2 \\ 2-2(2) = -2 & x = 2 \end{cases}$$



ب) $y = [x]|x|$

$$\begin{cases} 2x & -2 \leq x < -1 \\ x & -1 \leq x < 0 \\ 0 & 0 \leq x < 1 \\ x & 1 \leq x < 2 \\ 2 & x = 2 \end{cases}$$



الف) $y = 2x - [2x]$

$0 \leq 2x - [2x] < 1$

$RF = [0, 1)$

ب) $y = 2x - f[2x]$

$y = f(x - [x])$
 $0 \leq x - [x] < 1$

$RF = [0, 1)$

ج) $y = x - \delta \left[\frac{x}{\delta} \right]$

$y = \omega \left(\frac{x}{\omega} - \left[\frac{x}{\omega} \right] \right)$

$RF = [0, \omega)$

د) $y = [2x] - 2x$

$0 \leq [2x] - 2x < 1$

$RF = (-1, 0]$

$$و) y = r \sin x + r \cos x$$

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

$$Rf = [-\sqrt{1+r}, \sqrt{1+r}]$$

$$\rightarrow y = r \sin x - r \cos x$$

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

$$Rf = [-\sqrt{1+r}, \sqrt{1+r}]$$

$$ع) y = [r \sin x + d \cos x]$$

$$\sqrt{d+r} = \sqrt{r}$$

$$r \sin x + d \cos x$$

$$Rf = [-\sqrt{r}, \sqrt{r}]$$

$$-\sqrt{r} \leq d \leq \sqrt{r}$$

$$\sqrt{r} \leq d \leq \sqrt{r}$$

$$Rf = [-\sqrt{r}, \sqrt{r}]$$

$$\rightarrow y = \sqrt{\cos x - r \sin x}$$

$$\cos x - r \sin x$$

$$-\sqrt{1+r} \leq$$

$$-\sqrt{r} \leq$$

$$\sqrt{1+r} \leq$$

$$\sqrt{r} \leq$$

$$Rf = [-\sqrt{r}, \sqrt{r}]$$

$$الف) y = \sin^2 x + r \sin x + r$$

$$x_s = \frac{-b}{2a} = \frac{-r}{2} \rightarrow \sin x = -\frac{r}{2} \rightarrow \sin x \in [-1, 1]$$

$$\text{if } \sin x = 1 \rightarrow 1 + r + r = y \text{ max}$$

$$\text{if } \sin x = -1 \rightarrow 1 - r + r = 0 \text{ min}$$

$$Rf = [0, 4]$$

$$\rightarrow y = r \sin^2 x + r \sin x + r$$

$$-\frac{r}{2} \rightarrow r \sin^2 x + r \sin x + r = \frac{r - 1 + 1}{2} = \frac{r}{2}$$

$$\text{if } \sin x = 1 \rightarrow r + r + r = y \text{ max}$$

$$\text{if } \sin x = -1 \rightarrow r - r + r = 1$$

$$Rf = [-\frac{1}{2}, 4]$$

$$و) y = \sin^2 x + r \cos^2 x$$

$$y = \sin^2 x + \cos^2 x + r \cos^2 x$$

$$y = 1 + r \cos^2 x$$

$$\cos^2 x \in [0, 1]$$

$$r \cos^2 x \in [0, r]$$

$$Rf = [1, 1+r]$$

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

$$\frac{r \cos^2 x}{\sin^2 x} \rightarrow \frac{1}{\sin^2 x}$$

$$r \sin^2 x \cos^2 x$$

$$\sin^2 x = r \sin^2 x \cos^2 x$$

$$\Rightarrow Rf = [-1, 1]$$

$$الف) y = \sin^4 x + \cos^4 x \text{ if } r=k \leq k=r$$

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

$$r^{1-k} \leq \sin^4 x + \cos^4 x \leq 1$$

$$\leq \frac{1}{r}$$

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

$$\rightarrow y = [\sin^4 x + \cos^4 x] \text{ if } r=k=1 \leq k=r$$

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

$$\frac{1}{1}$$

$$[\sin^4 x + \cos^4 x] \rightarrow 0, 1$$

$$Rf = [0, 1]$$

$$و) y = \frac{rx^r + vx - r}{x + r}$$

$$rx^r + vx - r \rightarrow x^r + vx - 1 \rightarrow (x+1)(x-1)$$

$$-r \leq \frac{1}{r}$$

$$(x+r)(x-1)$$

$$(x+r)$$

$$\rightarrow x-1$$

$$x = -r \rightarrow x-1 = (x-r)-1 = -1 \Rightarrow Rf = [r, -1]$$

$$\rightarrow y = \frac{x^r - 1}{x - 1}$$

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

$$y = x^{r-1} + x^{r-2} + \dots + 1$$

$$y_s = \frac{1-r}{-r} = \frac{r}{c}$$

$$Rf = [\frac{r}{c}, +\infty)$$

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

نکته: اگر $x = -r$ باشد، y به $-\infty$ میل می کند.

نکته: اگر $x = 1$ باشد، $y = r$.