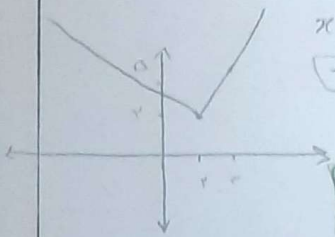


الف) $y = x + |2x - 4|$



جدول تغییرات علامت برای $y = x + |2x - 4|$:

$2x - 4 < 0$	$2x - 4 \geq 0$
$x - 2x + 4 = -x + 4$	$x + 2x - 4 = 3x - 4$
$-x + 4$	$3x - 4$

$R_f = [2, +\infty)$

$|3x - 4| - |x + 2| = k$

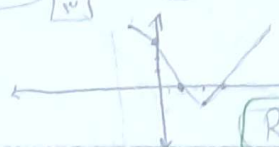
جدول تغییرات علامت برای $|3x - 4| - |x + 2| = k$:

$3x - 4 < 0$	$3x - 4 \geq 0$
$-(3x - 4) - (x + 2) = -4x + 2$	$(3x - 4) - (x + 2) = 2x - 6$
$-4x + 2$	$2x - 6$

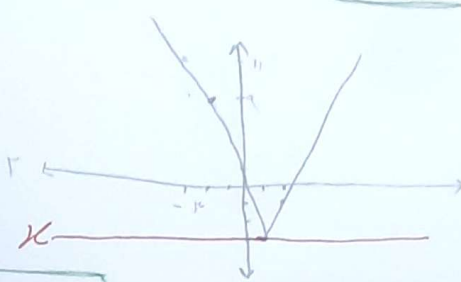
ب) $y = |2x - 2| + |x - 1| - |2x|$

جدول تغییرات علامت برای $y = |2x - 2| + |x - 1| - |2x|$:

$2x - 2 < 0$	$2x - 2 \geq 0$
$-(2x - 2) + x - 1 - 2x = -4x + 2 + x - 1 $	$(2x - 2) + x - 1 - 2x = -2 + x - 1 $

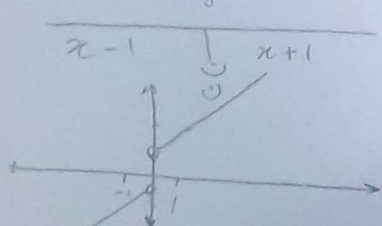


$R_f = [-1, +\infty)$

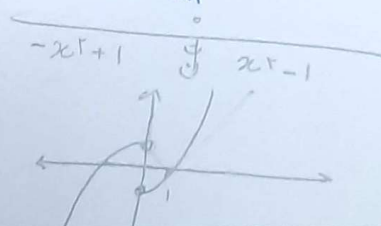


$k = -3$

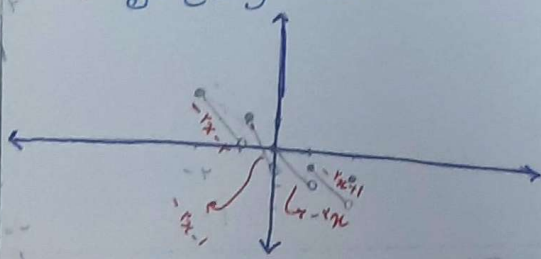
الف) $y = x + \frac{x}{|x|}$



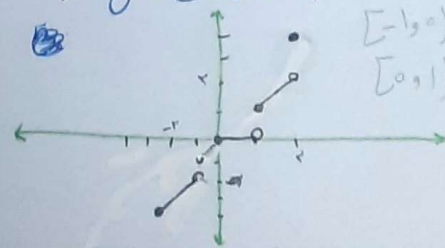
ب) $y = x|x| - \frac{x}{|x|}$



الف) $y = [x] - 2x$



ب) $y = [x]|x|$



الف) $2x - [2x] \rightarrow x \in \mathbb{Z} \Rightarrow \{0\} \rightarrow \{R_f = [0, 1)\}$

ب) $f(x - [x]) = R_f = [0, 1)$ ج) $x - 5[\frac{x}{5}] \rightarrow x = 5k \rightarrow 5x - 5k = 0$

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

$$\rightarrow [-\sqrt{a^2+b^2}, \sqrt{a^2+b^2}]$$

الف) $y = 3\sin x + 4\cos x \rightarrow [-\sqrt{13}, \sqrt{13}] = R_f$

ب) $y = 4\sin x - 3\cos x \rightarrow [-5, 5] = R_f$

ج) $y = [2\sin x + 5\cos x] \rightarrow R_f = \{-5, -4, \dots, 5\}$

د) $y = \sqrt{\cos x - 2\sin x} \rightarrow R_f = [0, \sqrt{5}]$

الف) $y = \sin^2 x + 3\sin x + 2$
 $\sin x \begin{cases} 1 \rightarrow 1+3+2=6 \\ -1 \rightarrow -1-3+2=-2 \end{cases}$
 $\frac{-b}{2a} = \frac{-3}{2} \times$

$R_f = [-2, 6]$

ب) $y = 2\sin^2 x + 3\sin x + 2$

(1) $2+3+2=7$
 $\sin x \begin{cases} 1 \rightarrow 2+3+2=7 \\ -1 \rightarrow 2-3+2=1 \end{cases}$
 $(\frac{-3}{2}) \frac{9}{4} - \frac{11}{4} + \frac{14}{4} = \frac{5}{4}$

$R_f = [\frac{5}{4}, 7]$

الف) $y = \sin^2 x + 4\cos^2 x$
 $\sin^2 x + 4(1 - \sin^2 x)$
 $-3\sin^2 x + 4$

$\sin^2 x \in [0, 1] \rightarrow -3 \in [-3, 0]$
 $1 \in [3, 4] \Rightarrow R_f = [1, 4]$

ب) $y = \frac{2 \cos^2 x}{\sin x}$
 $\frac{1}{\sin x} \sin x$

$2 \sin x \cos x = \sin 2x \Rightarrow R_f = [-1, 1]$

الف) $y = \sin^4 x + \cos^4 x$
 $x = \frac{\pi}{2}$

$2^{-2} < y < 1 \Rightarrow R_f = [\frac{1}{2}, 1]$

ب) $y = [\sin^4 x + \cos^4 x]$
 $x = \frac{\pi}{4}$

$2^{-2} < y < 1 \Rightarrow R_f = [\frac{1}{2}, 1]$

رقت در بیان
 $R_f = \{0, 1\}$

الف) $y = \frac{x^2 + 7x - 4}{x + 5}$

$x^2 + 7x - 4 \rightarrow (x + \frac{7}{2})(x - 1)$

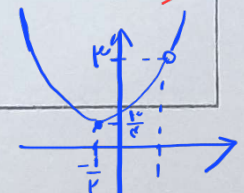
$\frac{(x + \frac{7}{2})(x - 1)}{(x + 5)} \Rightarrow 2x - 1 \Rightarrow R_f = \mathbb{R}$
 $(x + \frac{7}{2}) \rightarrow [-9]$

ب) $y = \frac{x^3 - 1}{x - 1} \Rightarrow \frac{(x-1)(x^2+x+1)}{(x-1)}$

$x^2 + x + 1 \rightarrow R = [-\frac{1}{4}, \infty) \rightarrow [\frac{3}{4}, \infty)$

اگر $x = 1 \rightarrow 1+1+1=3$

$R_f = [\frac{3}{4}, \infty) - \{1\}$



$R_f = \mathbb{R} - \{-9\}$