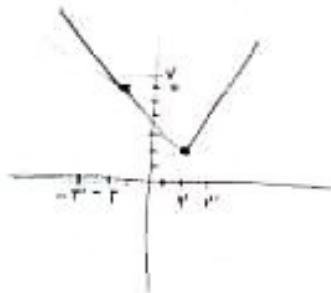


الف) $y = x + |2x - 4|$

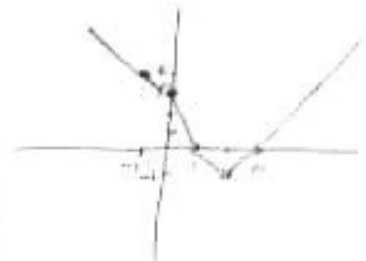
$$\begin{cases} 3x - 4 & x \geq 2 \\ -x + 4 & x < 2 \end{cases}$$



$$R_f = [2, +\infty)$$

ب) $y = |x - 2| + |x - 1| - |x|$

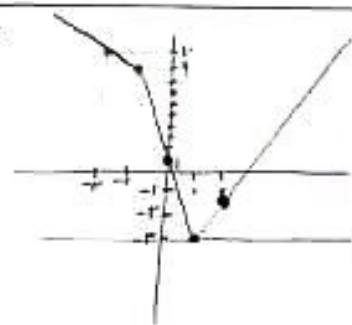
$$\begin{cases} x = 2 \rightarrow y = 0 \\ x = 1 \rightarrow y = -1 \\ x = 0 \rightarrow y = 2 \\ x = -1 \rightarrow y = 3 \end{cases}$$



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

الف) $|3x - 3| - |x + 2| = k$

$$\begin{cases} 2x - 5 & x > 1 \\ -4x + 1 & -1 \leq x \leq 1 \\ -2x + 5 & x < -1 \end{cases} \rightarrow$$



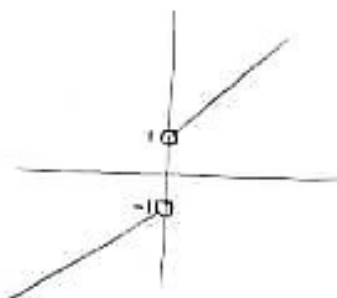
$$\Rightarrow k = -3$$

چون در سوال گفته اند که در نقطه اشتباه
بین تابع در هر دو طرف K می تواند نقطه مشترک
داشت باشد و فقط در نقطه (3) این اتفاق می افتد

الف) $y = x + \frac{x}{|x|}$

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

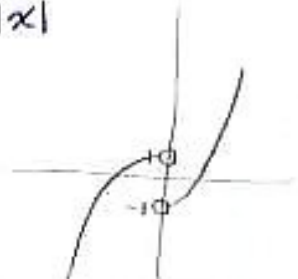
$$R_f = \mathbb{R} - [-1, 1]$$



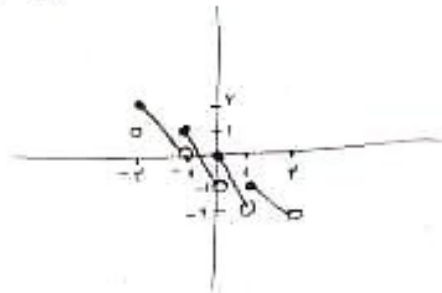
ب) $y = x|x| - \frac{x}{|x|}$

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

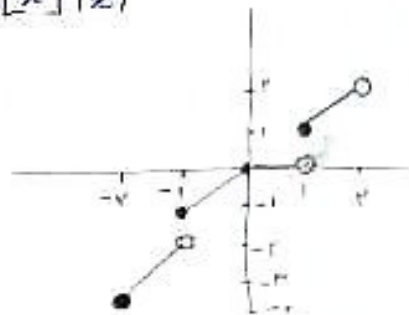
$$R_f = \mathbb{R}$$



الف) $y = [x] - 2x$



ب) $y = [x]|x|$



الف) $y = 3x - [3x]$

$$0 \leq 3x - [3x] < 1 \quad R_f = [0, 1)$$

ب) $y = 4x - 4[x]$

$$\begin{cases} 4(x - [x]) \\ 0 \leq 4(x - [x]) < 4 \rightarrow R_f = [0, 4) \end{cases}$$

ج) $y = x - \lfloor \frac{x}{5} \rfloor \Rightarrow y = \frac{x}{5} - \lfloor \frac{x}{5} \rfloor$

$$0 \leq \frac{x}{5} - \lfloor \frac{x}{5} \rfloor < 1 \quad \frac{y}{5} \rightarrow [0, 1) \rightarrow y \rightarrow [0, 5)$$

$$R_f = [0, 5)$$

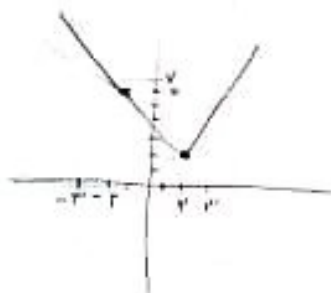
د) $y = [2x] - 2x$

$$-2x + [2x] \xrightarrow{x=1} 2x - [2x] = -y$$

$$R_f = (-1, 0]$$

الف) $y = x + |2x - 4|$

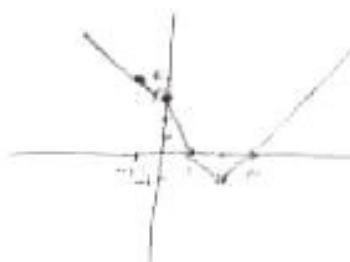
$$\begin{aligned} 3x - 4 & \quad x \geq 2 \\ -x + 4 & \quad x < 2 \end{aligned}$$



$R_f = [2, \infty)$

ب) $y = |x - 2| + |x - 1| - |x|$

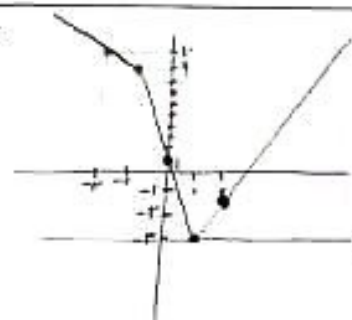
$$\begin{aligned} x \geq 2 & \rightarrow y = 0 \\ x = 2 \rightarrow y = -1 \\ x = 1 & \rightarrow y = 0 \\ x = 0 & \rightarrow y = 2 \\ x = -1 & \rightarrow y = 3 \end{aligned}$$



$R_f = [-1, \infty)$

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

$$\begin{aligned} 3x - 3 & \quad x > 1 \\ -3x + 1 & \quad -1 \leq x \leq 1 \\ -3x + 3 & \quad x < -1 \end{aligned} \rightarrow$$



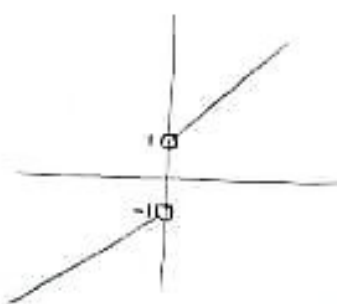
$\Rightarrow k = -3$

چون در سوال گفته اند که در نقطه اشتباه
بین تابع و در هر دو K می باشد فقط مشترک
داشتن است و فقط در نقطه (3) اشتقاق 0 است

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الف) $y = x + \frac{x}{|x|}$

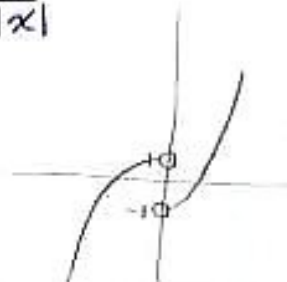
$$\begin{aligned} x > 0 & \rightarrow x + 1 \\ x < 0 & \rightarrow x - 1 \\ x & \neq 0 \end{aligned}$$



$R_f = \mathbb{R} - [-1, 1]$

ب) $y = x|x| - \frac{x}{|x|}$

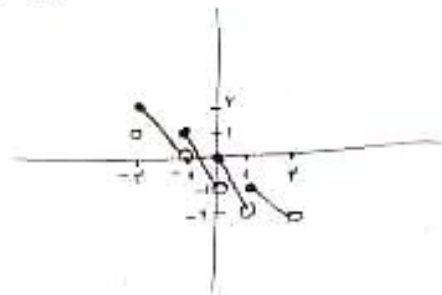
$$\begin{aligned} x > 0 & \rightarrow x^2 - 1 \\ x < 0 & \rightarrow -x^2 + 1 \end{aligned}$$



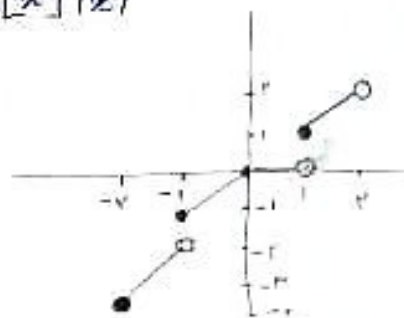
$R_f = \mathbb{R}$

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الف) $y = [x] - 2x$



ب) $y = [x]|x|$



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الف) $y = 3x - [3x]$

$$0 \leq 3x - [3x] < 1 \quad R_f = [0, 1)$$

ب) $y = 4x - 4[x]$

$$\begin{aligned} 4(x - [x]) \\ 0 \leq 4(x - [x]) < 4 \rightarrow R_f = [0, 4) \end{aligned}$$

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ج) $y = x - \lfloor \frac{x}{5} \rfloor \xrightarrow{\frac{x}{5} = \frac{y}{5}} y = \frac{x}{5} - \lfloor \frac{y}{5} \rfloor$

$$0 \leq \frac{x}{5} - \lfloor \frac{x}{5} \rfloor < 1 \xrightarrow{\frac{x}{5} = y} y \in [0, 1) \xrightarrow{x \in [0, 5)} y \in [0, 5)$$

$R_f = [0, 5)$

د) $y = [2x] - 2x$

$$-2x + [2x] \xrightarrow{x=1} 2x - [2x] = -y$$

$R_f = (-1, 0]$