

الف) $y^3 - x = 2x^2$

$y_1 = 2x_1^2 + x_1$
 $y_2 = 2x_2^2 + x_2$

$y_1^3 = y_2^3 = 6y_1 = y_2$ ← با هم نیست ✓

۲) با هم نیست

ب) $|81 + x^2| = x + 3$

$\Rightarrow x=0$ $|y|=3 \Rightarrow y = \pm 3$ ← با هم نیست ✓

۱) با هم نیست

ج) $\sqrt{x-4} + |y-2| = 0$

با هم نیست به ازای $|x-4|$ ✓

د) $\cos y = x \Rightarrow \cos y = 0$ ✓

$y = \frac{\pi}{2}, \frac{3\pi}{2}$ یعنی $x=0$

y دو مقدار دارد پس با هم نیست

الف) $y = \frac{x+4}{x^2-4x}$

$x^2-4x \neq 0$
 $x(x-4) \neq 0 \Rightarrow x \neq 0, 4$

$DF = R - \{0, 4\}$ ✓

ب) $\frac{x+4}{x^2-4x+14}$

$\Rightarrow x^2-4x+14 \neq 0$

$\Delta = 16 - 56 = -40$

همه وقت مخرج منفرجه شود

$DF = R$

ج) $y = \frac{x+4}{x^2+x+4}$

$\Rightarrow x^2+x+4 \neq 0$

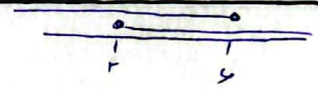
$\Delta = 1 - \frac{16}{14}$

$DF = R$ ✓
 مخرج منفی نمی شود

د) $\frac{x+4}{x^2-4x^2} \Rightarrow \frac{x+4}{x^2(x-4)}$
 $DF = R - \{2, -2, 0\}$

الف) $\sqrt{9-x} + \sqrt{x-2}$

$x-2 \geq 0 \Rightarrow x \geq 2$
 $9-x \geq 0 \Rightarrow x \leq 9$
 $-2 \leq x \leq 9$



$DF = [2, 9]$ ✓

ب) $\frac{2x+1}{x^2+1}$

$x^2+1 \neq 0$ همیشه مثبت $\Rightarrow DF = R$ ✓

ج) $\frac{x-2}{x-4}$

$x-2 \neq 0 \Rightarrow x \neq 2$
 $x-4 \neq 0 \Rightarrow x \neq 4$

$DF = R - \{2, 4\}$ ✓

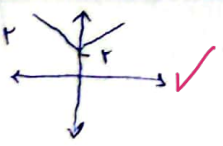
د) $y = \frac{2x+2}{1x+2x}$

$\frac{1x+1}{1x+2x} \neq 0 \Rightarrow x \neq 0$

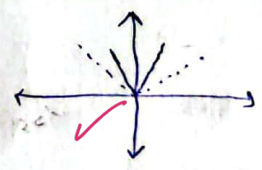
$DF = R - \{0\}$ ✓

مهم است ضابطه انبوهی!

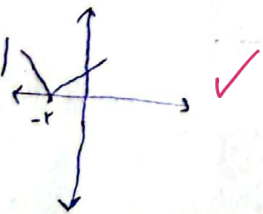
الف) $y = |x| + 2$



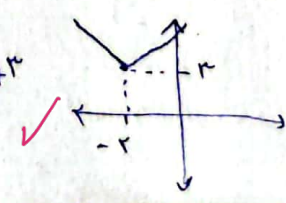
ب) $y = 2x$



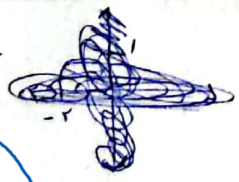
ج) $y = |x+2|$



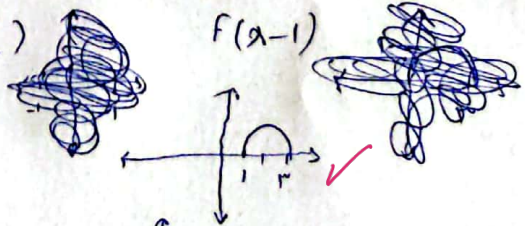
د) $y = |x+2| + 3$



الف) $f(x) + 2$



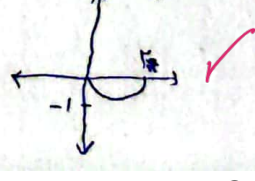
ج) $f(x-1)$



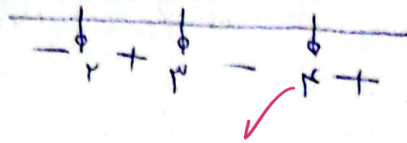
ب) $2f(x)$



د) $-f(x)$



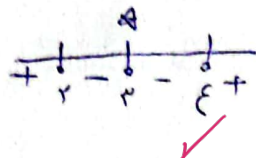
$$a) y = \frac{x^2(x-1)(x-2)(x-3)}{(x-1)(x-2)(x-3)}$$



$$\begin{aligned} (x \rightarrow +\infty) U(x, 1) &= + \\ (-\infty, x) U(x, 2) &= - \\ \{1\} \cup \{2\} \cup \{3\} &= \emptyset \end{aligned}$$

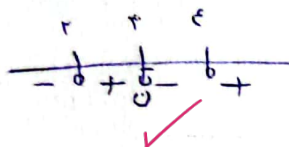
(2)

$$b) y = \frac{x^2(x-1)(x-2)(x-3)}{(x-1)(x-2)(x-3)}$$



$$\begin{aligned} (x \rightarrow +\infty) U(x, 1) &= + \\ (x, 2) &= - \\ \{1\} \cup \{2\} \cup \{3\} &= \emptyset \end{aligned}$$

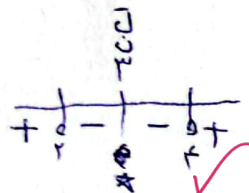
$$c) y = \frac{x^2(x-1)(x-2)}{(x-1)(x-2)}$$



$$\begin{aligned} (x \rightarrow +\infty) U(x, 1) &= + \\ (x, 2) U(-\infty, x) &= - \\ \{1\} \cup \{2\} &= \emptyset \end{aligned}$$

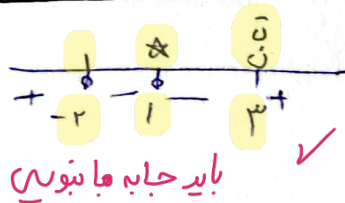
(2)

$$d) y = \frac{x^2(x-1)(x-2)}{(x-1)(x-2)}$$



$$\begin{aligned} (x \rightarrow +\infty) U(-\infty, x) &= + \\ (x, 1) &= - \\ \{1\} \cup \{2\} &= \emptyset \end{aligned}$$

$$e) \frac{x^3 - 4x^2 + 4x}{x-2} = \frac{(x-1)(x+2)(x-1)}{(x-2)}$$

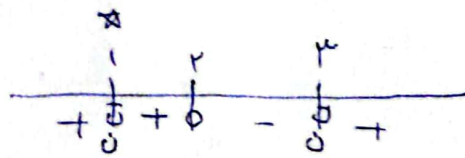


باید جانب را بنویس

$$\begin{aligned} (x \rightarrow +\infty) U(-\infty, x) &= + \\ (-x, 2) &= - \\ \{1\} \cup \{-2\} &= \emptyset \end{aligned}$$

(2)

$$f) \frac{x^3 - 4x^2 + 4x}{x^2 - 4x + 4} = \frac{(x-1)(x-2)}{(x-2)(x-2)}$$



$$\begin{aligned} (\infty, 1) U(1, 2) U(x, +\infty) &= + \\ (x, 2) &= - \\ \{2\} &= \emptyset \end{aligned}$$

$$g) \frac{x^2 - x^2}{x^2 - x^2} = \frac{x^2(x-1)}{x^2(x-1)(x+1)}$$

$$\Delta = b^2 - 4ac$$

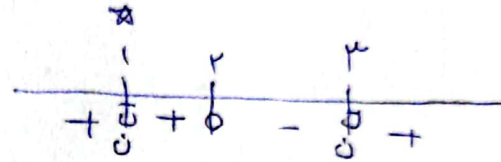
$$1^2 - 4 \times 1 \times 1 = \Delta < 0$$

$$a) \frac{x^2 - 3x + 1}{x - 3} = \frac{(x-1)(x+1)(x-1)^{-1}}{(x-3)} \star$$



$$\begin{aligned} 1^2(+\infty) \cup (-\infty, 2) &= + \\ 1^2(2) &= - \\ \{1\} \cup \{2\} &= 0 \end{aligned}$$

$$b) \frac{x^2 - 3x + 1}{x^2 - 4x + 3} = \frac{(x-1)(x+1)}{(x-3)(x-1)} \star$$



$$\begin{aligned} (\infty, 1) \cup (1, 2) \cup (3, +\infty) &= + \\ (2, 3) &= - \\ \{2\} &= 0 \end{aligned}$$

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

$$\Delta = b^2 - 4ac$$

همیشه ماه منی تقاضی باشد



$$(1, +\infty) \cup (-\infty, -1) = +$$

$$(0, 1) \cup (-1, 0) = - \quad \{0\} \cup \{1\} \cup \{-1\} = 0$$

$$b) \frac{x^2 + 3x + 1}{x^2 + 2x + 3}$$

$$\Delta = b^2 - 4ac$$

نه اضافی هر مقدار مثبت است

$$4 - 4 \times 3 \times 1 = -8 < 0$$

$$\Delta < 0$$

هر عددی در این عبارت یکبار هم جواب می شود

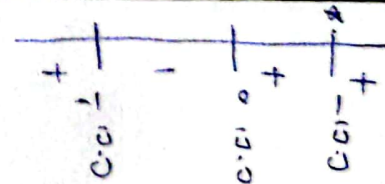
$$x - \frac{4 \times 3 \times 1}{13}$$

نه اضافی هر مقدار مثبت است

$$a) \sqrt{\frac{x^2 - 1}{x^2 - 2}}$$

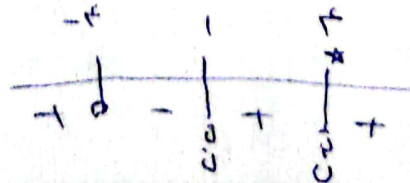
$$\frac{x^2 - 1}{(x-1)(x+1)(x-2)}$$

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



$$Df = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$$

$$b) \sqrt{\frac{x^2 - 14}{x^2 - 5x + 6}} = \sqrt{\frac{(x+4)(x-4)}{(x-1)(x-6)}}$$



$$Df = (-\infty, -4] \cup (1, 6) \cup (6, +\infty)$$