

الف) $y^3 - x = 2x^2 \Rightarrow y^3 = 2x^2 + x \rightarrow y_1^3 = 2x^2 + x$ $y_1^3 = y_2^3 \Rightarrow y_1 = y_2^{-1}$

$y_2^3 = 2x^2 + x$

تابع هست.

تعریف ریاضی

ب) $|y| + x^2 = x + 3 \rightarrow |y| = -x^2 + x + 3 \xrightarrow{x=2} |y| = -4 + 2 + 3 \rightarrow |y| = 1 \Rightarrow$

$y \rightarrow 1$
 $y \rightarrow -1$ تابع نیست

مثال نقض

ج) $\sqrt{x-4} + |y-2| = 0 \Rightarrow x=4, y=2$ تابع هست.
هر عبارت مثبت است پس هر عبارت صفر بوده

د) $x = \cos y \xrightarrow{x=0} 0 = \cos y \Rightarrow y \rightarrow 90^\circ, 270^\circ$

تابع نیست

مثال نقض

الف) $y = \frac{x+4}{x^2-4x} \Rightarrow x^2-4x \neq 0 \rightarrow x(x-4) \neq 0 \Rightarrow R - \{0, 4\}$

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ب) $y = \frac{x+4}{x^2-7x+12} \rightarrow \Delta = b^2 - 4ac$

$Df = R$

$49 - 64 = -15 \Rightarrow \Delta$ منفی است پس

ج) $y = \frac{x+4}{x^2+x+4} \rightarrow \Delta = b^2 - 4ac$

$Df = R$

$1 - 4 = -3 \Rightarrow \Delta$ منفی است پس

ریشه ندارد و مخرج نمی تواند منفی باشد.

د) $y = \frac{x+4}{x^2-4x^2} \rightarrow x^2-4x^2 \neq 0 \rightarrow x^2(x^2-4) \neq 0 \Rightarrow x \neq 0, x \neq \pm 2$

$Df = R - \{\pm 2, 0\}$

الف) $y = \sqrt{4-x} + \sqrt{x-2}$

$$\begin{aligned} 4-x &\geq 0 & x-2 &\geq 0 \\ 4 &\geq x & x &\geq 2 \end{aligned}$$

$$Df = [2, 4]$$

ب) $y = \frac{3x+1}{x^2+1} \rightarrow x^2+1 \neq 0$
چون هر عدد + است پس
هیچگاه اخراج صفر نمی شود.

$$Df = \mathbb{R}$$

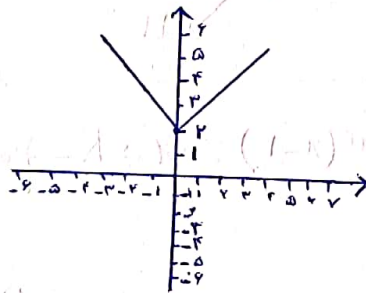
ج) $y = \frac{\sqrt{x-2}}{x-4}$

$$\begin{aligned} x-2 &\geq 0 & x-4 &\neq 0 \Rightarrow x \neq 4 \\ x &\geq 2 \end{aligned}$$

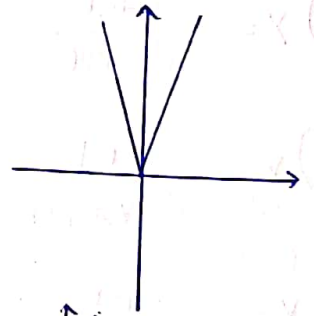
$$Df = [2, +\infty) - \{4\}$$

د) $y = \frac{2x+3}{|x|+x^2} \rightarrow |x|+x^2 \neq 0 \Rightarrow Df = \mathbb{R} - \{0\}$

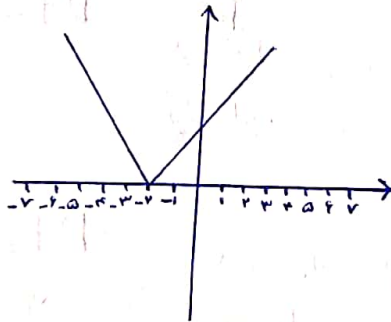
الف) $y = |x|+2$



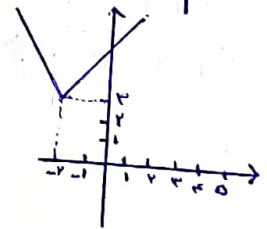
ب) $y = 2|x|$



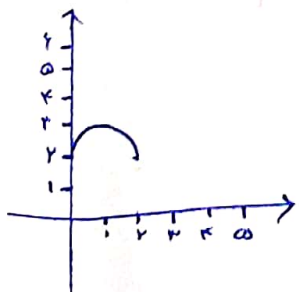
ج) $y = |x+2|$



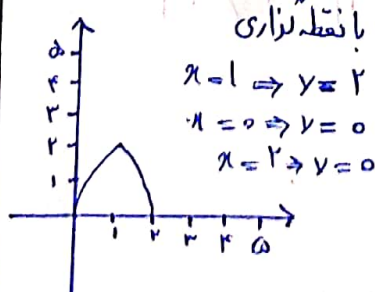
د) $y = |x+2|+3$



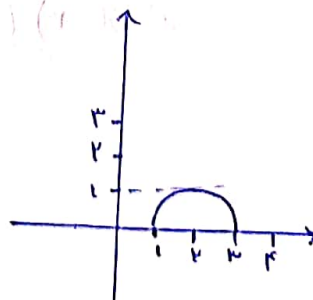
الف) $f(x)+2$



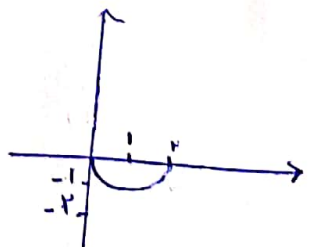
ب) $\frac{2f(x)}{x(2-x)} = \frac{2x(x-x)}{x(2-x)}$



ج) $f(x-1)$

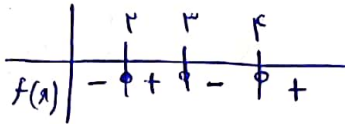


د) $-f(x)$

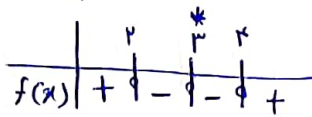


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الف) $y = (x-2)(x-3)(x-4)$

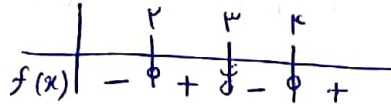


ب) $y = (x-2)(x-3)^2(x-4)$

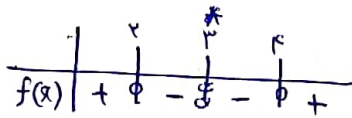


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الف) $y = \frac{(x-2)(x-4)}{x-3}$

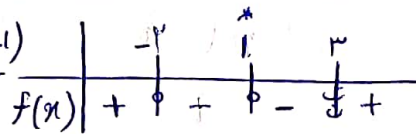


ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$

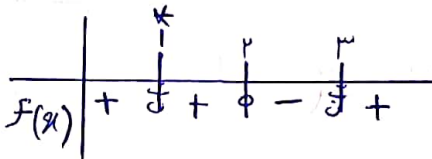


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الف) $y = \frac{x^3 - 2x + 2}{x-3} = \frac{(x-1)(x+2)(x-1)}{(x-3)}$



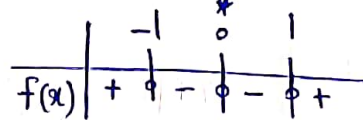
ب) $y = \frac{x^2 - 3x + 2}{x^2 - 4x + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)}$



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الف) $y = \frac{x^4 - x^2}{x^2 + x + 2}$

$x^2(x^2 - 1)$
 ± 1

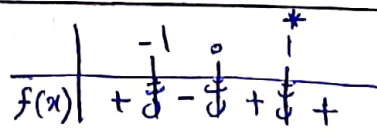


هنگامه صفر
نمی شود
 $1^2 - (4 \times 2) = -7$

پارسا راجانی $b^2 - 4ac = \Delta$

ب) $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3}$
صفر نمی شود
در بیشه ندارد
 $2^2 - 4 \times 3 = -8$

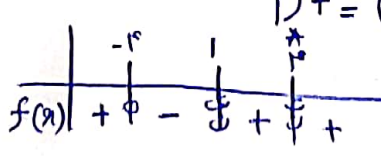
الف) $y = \sqrt{\frac{x^3 - 1}{x^3 - x}}$ $\frac{x^3 - 1}{x^3 - x} \geq 0 \rightarrow \frac{x^3 - 1}{x(x^2 - 1)} \geq 0$



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ب) $y = \sqrt{\frac{x^2 - 12}{x^2 - 5x + 4}}$

$\frac{(x+4)(x-4)}{(x-1)(x-4)}$
 $\downarrow$ $\downarrow$
 1 4



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

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