

تایید هست ✓  
 الف)  $y^3 - x = 2x^2 \rightarrow y^3 = x + 2x^2 \rightarrow y^3 = x(1 + 2x) \rightarrow y^3 = x \rightarrow y = \sqrt[3]{x} \rightarrow y = \sqrt[3]{x} \rightarrow y = \sqrt[3]{x}$

ب)  $x + x^2 = x + 3 \xrightarrow{x=0} |x| = 3 \rightarrow y = \pm 3$  تابع نیست

ج)  $\sqrt{x} = 4 + |y - 2| = 0 \rightarrow x = 16 \rightarrow y = 2$  تایید هست ✓  
 د)  $x = \cos y \xrightarrow{x=0} \cos y = 0 \rightarrow y = \frac{\pi}{2}, \frac{3\pi}{2}$  تابع نیست

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

ب)  $y = \frac{x^2 + 4}{x^2 - 4x + 4} \rightarrow x^2 - 4x + 4 \neq 0 \rightarrow (x - 2)^2 \neq 0 \rightarrow x \neq 2 \rightarrow Df = \mathbb{R}$   
 دقت فرمایید - است در این مورد.

ج)  $y = \frac{x^2 + 4}{x^2 + x + 4} \rightarrow x^2 + x + 4 \neq 0 \rightarrow x^2 + x + 4 = 0 \rightarrow \Delta = 1 - 16 = -15 < 0 \rightarrow Df = \mathbb{R}$

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

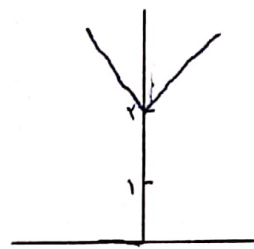
الف)  $y = \sqrt{9 - x} + \sqrt{x - 2} \rightarrow 9 - x \geq 0 \rightarrow x \leq 9$  و  $x - 2 \geq 0 \rightarrow x \geq 2 \rightarrow Df = [2, 9]$

ب)  $y = \frac{x^2 + 1}{x^2 + 1} \rightarrow x^2 + 1 \neq 0 \rightarrow x^2 \neq -1 \rightarrow x \in \mathbb{R} \rightarrow Df = \mathbb{R}$

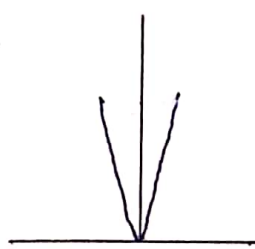
ج)  $y = \frac{\sqrt{x - 2}}{x^2} \rightarrow x - 2 \geq 0 \rightarrow x \geq 2$  و  $x^2 \neq 0 \rightarrow x \neq 0 \rightarrow Df = [2, +\infty) - \{0\}$

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

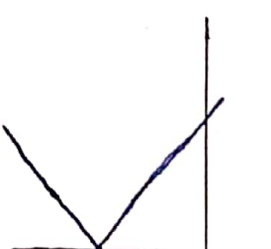
الف)  $y = |x| + 2$



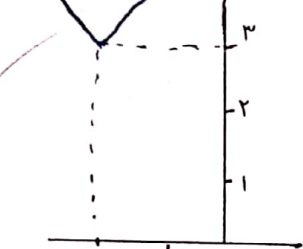
ب)  $y = 2|x|$



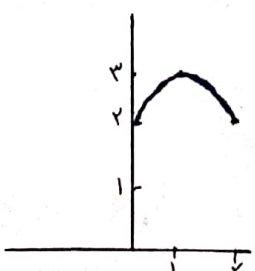
ج)  $y = |x + 2|$



د)  $y = |x + 2| + 2$



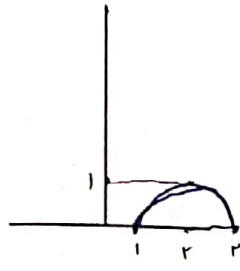
الف)  $f(x) + 2$



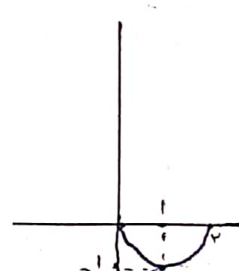
ب)  $2f(x)$



ج)  $f(x - 1)$



د)  $-f(x)$



الف)  $y = (x-2)(x-3)(x-4) \rightarrow$   $\begin{array}{c|ccc} x & 2 & 3 & 4 \\ \hline & - & + & - & + \end{array}$

ب)  $y = (x-2)(x-3)^2(x-4) = (x-2)(x-3)(x-3)(x-4) \rightarrow$

$\begin{array}{c|ccc} x & 2 & 3^* & 4 \\ \hline & + & - & - & + \end{array}$

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الف)  $y = \frac{(x-2)(x-4)}{x-3} \rightarrow$   $\begin{array}{c|ccc} x & 2 & 3 & 4 \\ \hline & - & + & - & + \end{array}$

ب)  $y = \frac{(x-2)(x-4)}{(x-3)^2} \Rightarrow \frac{(x-2)(x-4)}{(x-3)(x-3)} \rightarrow$   $\begin{array}{c|ccc} x & 2 & 3^* & 4 \\ \hline & + & - & - & + \end{array}$

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الف)  $y = \frac{x^3 - 3x + 2}{x-3} = \frac{(x-1)(x^2 + x - 2)}{x-3} = \frac{(x-1)(x-1)(x+2)}{x-3} \rightarrow$   $\begin{array}{c|ccc} x & 1 & 1^* & 2 \\ \hline & + & - & - & + \end{array}$

ب)  $y = \frac{x^3 - 3x + 2}{x^2 - 4x + 3} = \frac{(x-2)(x-1)}{(x-3)(x-1)} \rightarrow$   $\begin{array}{c|ccc} x & 1 & 2 & 3 \\ \hline & + & - & - & + \end{array}$

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الف)  $y = \frac{x^4 - x^2}{x^2 + x + 2} \rightarrow$   $\frac{x^2(x^2 - 1)}{x^2 + x + 2} \rightarrow \frac{x^2(x-1)(x+1)}{x^2 + x + 2} \rightarrow$   $\begin{array}{c|ccc} x & 1 & 1^* & 2 \\ \hline & + & - & - & + \end{array}$

ب)  $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3} \rightarrow$   $\Delta = 9 - 14 = -5$   $\rightarrow$   $Df = \{1, +\infty\}$   
 $\Delta = 4 - 9 = -5$   $\rightarrow$   $Df = \{1, +\infty\}$   
 به ازای  $x = 0$  نمی شود  
 به ازای  $x = 1$  در مخرج  $x^2 + 2x + 3$  و  $x^2 + x + 2$  قرار می گیرد

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الف)  $y = \sqrt{\frac{x^3 - 1}{x^3 - x}} \rightarrow x^3 - x \neq 0 \rightarrow x(x^2 - 1) \neq 0 \rightarrow x \neq 0, \pm 1$   
 $\frac{x^3 - 1}{x^3 - x} > 0 \rightarrow$   $\begin{array}{c|ccc} x & 1 & 1^* & 2 \\ \hline & + & - & - & + \end{array} \rightarrow Df = (1, +\infty) \cup (0, 1) \cup (-\infty, -1)$

ب)  $\sqrt{\frac{x^3 - 14}{x^3 - 9x + 4}} \rightarrow x^3 - 9x + 4 = (x-4)(x-1) \neq 0 \rightarrow x \neq 1, 4$   
 $\begin{array}{c|ccc} x & 1 & 4^* & 2 \\ \hline & + & - & - & + \end{array} \rightarrow Df = (1, 4) \cup (4, +\infty) \cup (-\infty, -4)$

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