

الف) $y^3 = 2x^2 + x \rightarrow \begin{cases} y^3 = 2x^2 + x \\ y^3 = 2x^2 + x \end{cases} \Rightarrow y_1 = y_2$ تابع است

ب) $|y| + x^2 = x + 3 \Rightarrow |y| = -x^2 + x + 3 \rightarrow |y| = -1 + 1 + 3 = 3$
 مکان نقض $|y| = 3$

ج) $\sqrt{x-4} + |y-2| = 0$ چون هر دو مثبت اند و جمع شده هر دو صفر اند $\sqrt{x-4} + |y-2| = 0 \Rightarrow \sqrt{x-4} = 0$ تابع است $y = \pm 3$

د) $x = \cos y$ $0 = \cos y \Rightarrow 0 = \cos \frac{\pi}{2}, \frac{3\pi}{2}$ تابع نیست

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

ب) $y = \frac{x+4}{x^2-4x+4} \Rightarrow x^2-4x+4 \neq 0$ $\Delta = b^2-4ac = 16-16 = 0$ $D_f = R$

ج) $y = \frac{x+4}{x^2+x+4} \Rightarrow x^2+x+4 \neq 0$ $\Delta = b^2-4ac = 1-16 = -15$ $D_f = R$

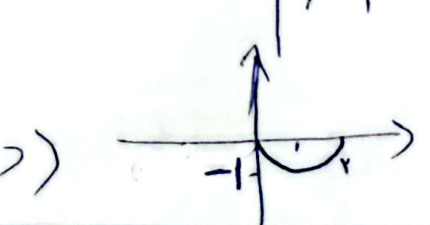
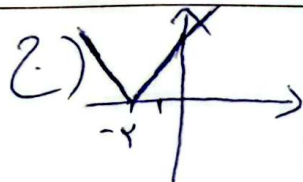
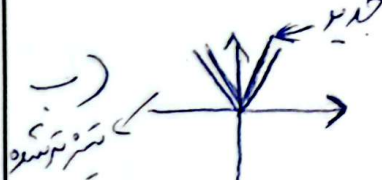
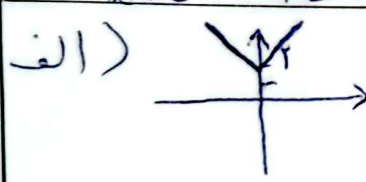
د) $y = \frac{x+4}{x^2-4x} \Rightarrow x^2-4x \neq 0 \Rightarrow x^2(x-4) = x^2(x+2)(x-2)$ $D_f = R - \{-2, 0, 2\}$

الف) $y = \sqrt{x-4} + \sqrt{x-2}$ $x-4 \geq 0 \Rightarrow x \geq 4$ $x-2 \geq 0 \Rightarrow x \geq 2$ $D_f = [4, \infty)$

ب) $y = \frac{3x+1}{x^2+1}$ $x^2+1 \neq 0$ $D_f = R$

ج) $y = \frac{\sqrt{x-2}}{x-4}$ $x-2 \geq 0 \Rightarrow x \geq 2$ $x-4 \neq 0 \Rightarrow x \neq 4$ $D_f = [2, 4) \cup (4, \infty)$

د) $y = \frac{12x+3}{12+x^2}$ $12+x^2 \neq 0$ $x \neq 0$ $D_f = R - \{0\}$



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

$$\frac{2}{-} \frac{3}{+} \frac{4}{-} \frac{+}{+} [2, 3] \cup [4, +\infty)$$

$$\rightarrow y = \frac{(x-2)(x-3)^2(x-4)}{x^2}$$

$$\frac{2}{+} \frac{3}{-} \frac{4}{-} \frac{+}{+} (-\infty, 2] \cup \{3\} \cup [4, +\infty)$$

$$\text{الف) } y = \frac{(x-2)(x-4)}{(x-3)^2}$$

$$\frac{2}{-} \frac{3}{+} \frac{4}{-} \frac{+}{+} [2, 3] \cup [4, +\infty)$$

$$\rightarrow y = \frac{(x-2)(x-4)}{(x-3)^2}$$

$$\frac{2}{+} \frac{3}{-} \frac{4}{-} \frac{+}{+} (-\infty, 2] \cup [4, +\infty)$$

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

$$\frac{-2}{+} \frac{1}{-} \frac{3}{-} \frac{+}{+}$$

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

$$(-\infty, -1] \cup \{1\} \cup (3, +\infty)$$

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

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

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

$$\frac{-1}{+} \frac{0}{-} \frac{1}{+}$$

$$\Delta = 1 - 4 = -3$$

$$\Delta = b^2 - 4ac = 9 - 12 = -3$$

$$(-\infty, -1] \cup \{0\} \cup [1, +\infty)$$

$$\rightarrow y = \frac{x^2 + 3x + 4}{x^2 + 2x + 2}$$

$$P_f = R$$

$$\frac{+}{+}$$

$$\text{الف) } y = \sqrt{\frac{x^2 - 1}{x^2 - x}}$$

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

$$\rightarrow y = \sqrt{\frac{x^2 - 1}{x^2 - x}}$$

$$\frac{-1}{+} \frac{0}{-} \frac{1}{+}$$

$$(-\infty, -1] \cup \{0\} \cup [1, +\infty)$$