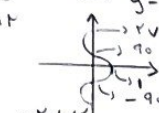


الف) $y^3 - x = 2x^2 \rightarrow y^3 = 2x^2 + x$
 $x_1 = x_2 \rightarrow 2x_1^2 + x_1 = 2x_2^2 + x_2 \rightarrow y_1^3 = y_2^3 \rightarrow y_1 = y_2 \rightarrow$ تابع است ✓

ب) $|y| + x^2 = x + 3 \rightarrow |y| = -x^2 + x + 3$
 $x_1 = x_2 \rightarrow -x_1^2 + x_1 + 3 = -x_2^2 + x_2 + 3 \rightarrow |y_1| = |y_2| \rightarrow y_1 = \pm y_2$ تابع نیست ✓

ج) $\sqrt{x-4} + |y-2| = 0 \rightarrow \begin{cases} x-4 \geq 0 \rightarrow x \geq 4 \\ y-2 = 0 \rightarrow y = 2 \end{cases} \rightarrow (4, 2)$ (یک نقطه) تابع است ✓

د) $x = \cos y$  چون اگر خط قائم یکسره مقدار را در بین از یک نقطه قطع می کند پس تابع نیست

الف) $\frac{x+4}{x^2-4x} = \frac{x+4}{x(x-4)} \rightarrow D_f = R - \{0, 4\}$ ۲

ب) $\frac{x+4}{x^2-7x+14} \rightarrow D_f = R$ $\Delta \text{خرج} = b^2 - 4ac = 49 - 4(1)(14) = 49 - 56 = -7 < 0$ $\rightarrow$ خرج هیچگاه صفر نمی شود ✓

ج) $\frac{x+4}{x^2+x+4} \rightarrow D_f = R$ $\Delta \text{خرج} = b^2 - 4ac = 1 - 4(1)(4) = 1 - 16 = -15 < 0$ $\rightarrow$ خرج هیچگاه صفر نمی شود ✓

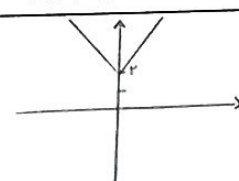
د) $\frac{x+4}{x^2-4x^2} = \frac{x+4}{x^2(x^2-4)} = \frac{x+4}{x^2(x+2)(x-2)} \rightarrow D_f = R - \{0, 2, -2\}$ ✓

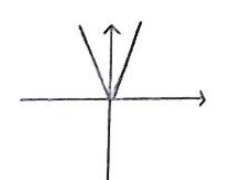
الف) $y = \sqrt{4-x} + \sqrt{x-2} \rightarrow \begin{cases} 4-x \geq 0 \rightarrow x \leq 4 \\ x-2 \geq 0 \rightarrow x \geq 2 \end{cases} \rightarrow D_f = [2, 4]$

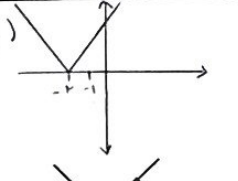
ب) $y = \frac{3x+1}{x^2+1} \rightarrow$ خرج همواره مثبت $\rightarrow D_f = R$

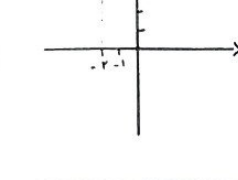
ج) $y = \frac{\sqrt{x-2}}{x-4} \rightarrow \begin{cases} x-2 \geq 0 \rightarrow x \geq 2 \\ x-4 \neq 0 \rightarrow x \neq 4 \end{cases} \rightarrow D_f = [2, 4) \cup (4, +\infty)$ ۲ ✓

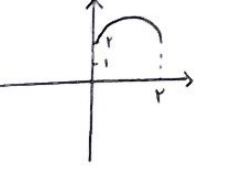
د) $y = \frac{2x+3}{|x|+x^2} \rightarrow D_f = R - \{0\}$

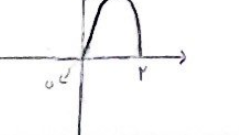
الف) $y = |x| + 2$  ۲ ✓

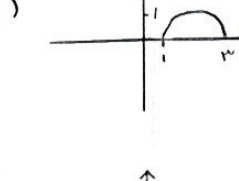
ب) $y = 2|x|$ 

ج) $y = |x+2|$ 

د) $y = |x+2| + 3$ 

الف) $f(x) + 2$  ۲ ✓

ب) $2f(x)$ 

ج) 

د) 

$$\text{الف) } (x-2)(x-3)(x-4)$$

$$\begin{array}{r} x^2 \quad x \quad x \\ - \quad + \quad - \quad + \end{array}$$

$$\text{ب) } (x-2)(x-3)^2(x-4)$$

$$\begin{array}{r} x^2 \quad x^2 \quad x \\ + \quad - \quad - \quad + \end{array}$$

Ⓟ ✓

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

$$\begin{array}{r} x^2 \quad x \quad x \\ - \quad + \quad - \quad + \end{array}$$

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

$$\begin{array}{r} x^2 \quad x^2 \quad x \\ + \quad - \quad - \quad + \end{array}$$

✓ Ⓟ

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

$$\begin{array}{r} -x^2 \quad x^2 \quad x \\ + \quad - \quad - \quad + \end{array}$$

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

$$\begin{array}{r} x^2 \quad x^2 \quad x \\ + \quad - \quad - \quad + \end{array}$$

Ⓟ ✓

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

$$\begin{array}{r} -x^2 \quad x^2 \quad 1 \\ + \quad - \quad - \quad + \end{array}$$

$$\Delta \text{ منجر ریشه ندارد} \rightarrow b^2 - 4ac = 1 - 4(1)(2) = 1 - 8 = -7 < 0$$

Ⓟ ✓

$$\text{ب) } y = \frac{x^2 + 3x + 4}{x^2 + 2x + 3}$$

$$\Delta \text{ صورت} = b^2 - 4ac = 9 - 4(1)(4) = 9 - 16 = -5 < 0 \rightarrow \text{صورت ریشه ندارد}$$

$$\Delta \text{ مخرج} = b^2 - 4ac = 4 - 4(1)(3) = 4 - 12 = -8 < 0 \rightarrow \text{مخرج ریشه ندارد}$$

عبارت همواره مثبت است

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

$$\begin{array}{r} -x^2 \quad x^2 \quad 1 \\ + \quad - \quad - \quad + \end{array}$$

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

Ⓟ ✓

$$\text{ب) } y = \sqrt{\frac{x^2 - 16}{x^2 - 5x + 4}} = \sqrt{\frac{(x+4)(x-4)}{(x-1)(x-4)}}$$

$$\begin{array}{r} -x^2 \quad x^2 \quad x \\ + \quad - \quad - \quad + \end{array}$$

$$\rightarrow D_f = (-\infty, -4] \cup (1, 4) \cup (4, +\infty)$$

1.