

$$y^3 - x = 2x^2 \xrightarrow{\text{تعیین}} y^3 = 2x^2 + x \left\{ \begin{array}{l} y_1^3 = y_2^3 \rightarrow y_1 = y_2 \checkmark \\ y_2^3 = 2x^2 + x \end{array} \right. \quad (1)$$

$$|y| + x^2 = x + 1^3 \xrightarrow{x=1} |y| = 1 + 1^3 - (1)^3 \rightarrow |y| = 1 \rightarrow y = \pm 1 \quad \text{تابع نیست}$$

$$\sqrt{x-4} + |y-2| = 0 \quad y=2 \quad x=4 \quad \text{جمع دو عدد مثبت صفر نیست} \quad \text{تابع نیست}$$

$$x = \cos y \rightarrow x=0 \rightarrow y = \left\{ k\pi + \frac{\pi}{2} \right\} \rightarrow y_0, y_1, \dots \quad \text{تابع نیست}$$

$$y = \frac{x+1}{x^2-4x} \quad D_f \Rightarrow x^2-4x \neq 0 \rightarrow x(x-4) \neq 0 \rightarrow x \neq \{0, 4\}$$

$$y = \frac{x+5}{x^2+7x+14} \quad D_f = \mathbb{R} - \{0, 4\}$$

$$y = \frac{x+5}{x^2+7x+14} \quad x^2+7x+14 \neq 0 \quad \Delta = 49 - (14 \times 4) = -17 \quad \text{ریشه ندارد}$$

$$y = \frac{x+5}{x^2+7x+14} \rightarrow D_f = \mathbb{R} \quad x^2+7x+14 \neq 0 \quad \Delta = 49 - 56 = -7 \quad \text{ریشه ندارد}$$

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

$$x^2-4x=0 \rightarrow x^2=4x \rightarrow x=4 \quad \boxed{x=0}$$

$$x^2+4x=0 \rightarrow x^2=-4x \quad x=-4$$

$$D_f = \mathbb{R} - \{0, 4, -4\}$$

$$y = \sqrt{9-x} + \sqrt{x-2} \quad x-2 \geq 0 \quad x \geq 2$$

$$9-x \geq 0 \rightarrow 9 \geq x \quad x \leq 9$$

$$D_f = [2, 9]$$

$$y = \frac{3x+1}{x^2+1} \quad x^2+1 \neq 0 \quad \text{همیشه مثبت}$$

$$D_f = \mathbb{R}$$

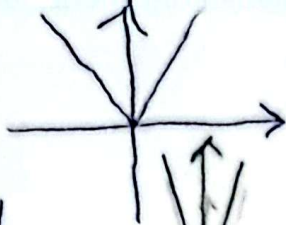
$$y = \frac{\sqrt{x-2}}{x+5} \quad x-2 \geq 0 \quad x \geq 2$$

$$D_f = [2, +\infty) - \{-5\}$$

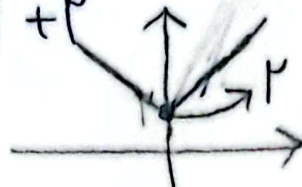
$$y = \frac{2x+3}{|x|+x^2} \quad \text{همیشه مثبت}$$

$$D_f = \mathbb{R}$$

$$y = |x|$$



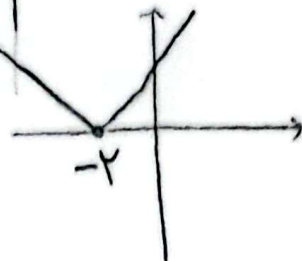
$$y = |x| + 1$$



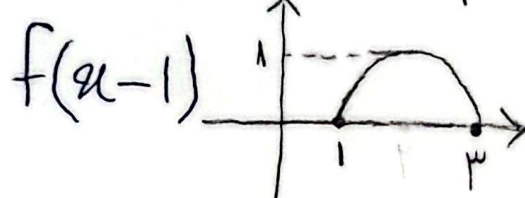
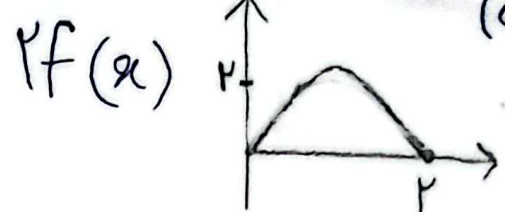
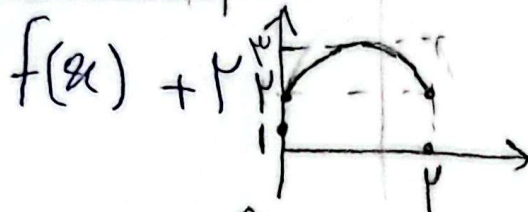
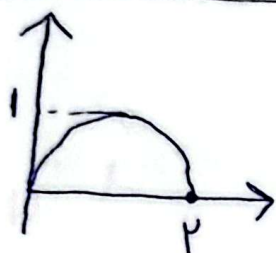
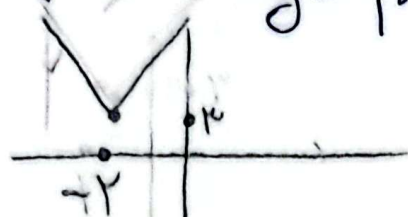
$$y = 2|x|$$



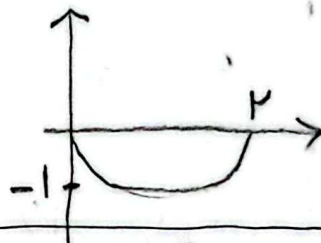
$$y = |x+1|$$



$$y = |x+1| + 1$$

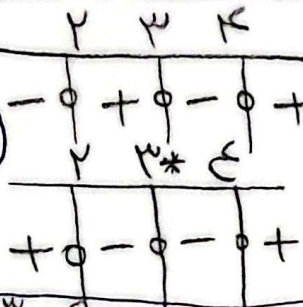


$$-f(x)$$



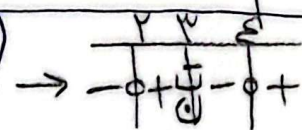
$$y = (x-2)(x-3)(x-5)$$

$$y = (x-2)(x-3)^2(x-5)$$

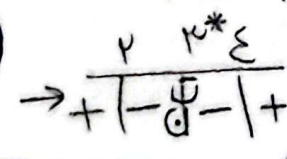


→ مفاصل 3

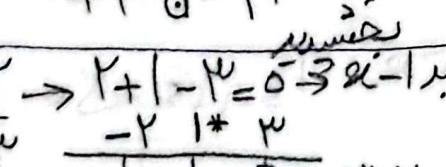
$$y = \frac{(x-2)(x-5)}{x-3}$$



$$y = \frac{(x-2)(x-5)}{(x-3)^2}$$



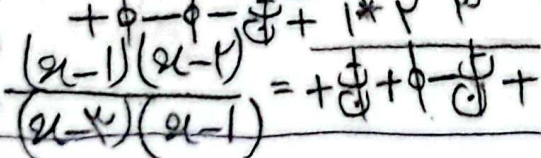
$$y = \frac{x^3 - 3x^2 + 2x}{x-3}$$



$$(x-1)(x^2+x-2)$$

$$(x-1)(x-1)(x+2)$$

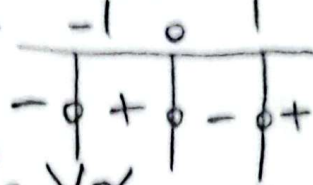
$$y = \frac{x^3 - 3x^2 + 2x}{x^2 - 5x + 6}$$



$$y = \frac{x^3 - x^2}{x^2 - x} = \frac{(x^2 - x)(x + 1)}{x^2 - x} \rightarrow x^2(x + 1) \rightarrow x^2 = 1 \rightarrow x = \pm 1 \quad (9)$$

$$x^2 + x + 1 \rightarrow \Delta = 1 - 4 = -3 < 0 \quad x^2 = 0 \rightarrow x = 0$$

ریشه ندارد و دایره منفی است.



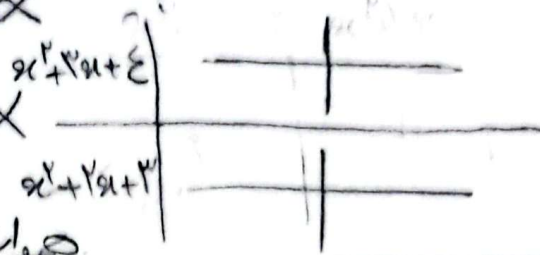
$$y = \frac{x^3 + 12x + 8}{x^2 + 12x + 12} \rightarrow \Delta = 9 - 144 = -135 < 0$$

صفر نمی شود.

$$x^2 + 12x + 12 \rightarrow \Delta = 144 - 48 = 96 > 0$$

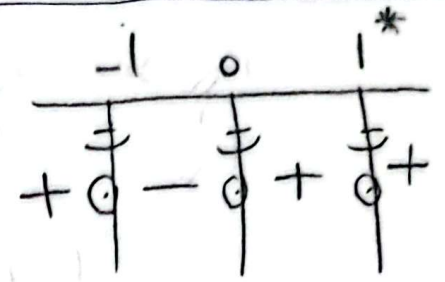
صفر می شود.

صفر مثبت



$$y = \sqrt{\frac{x^3 - 1}{x^3 - x}} \rightarrow x^3 - 1 = 0 \rightarrow x = 1$$

$$x^3 - x \rightarrow x(x^2 - 1) = 0 \rightarrow x = 1, -1, 0$$



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

$$y = \sqrt{\frac{x^2 - 16}{x^2 - 4x + 8}} \rightarrow x^2 - 16 \rightarrow (x - 4)(x + 4) \rightarrow$$

ریشه ها 4 و -4

$$x^2 - 4x + 8 \neq 0 \rightarrow (x - 1)(x - 3) \neq 0$$

$$x \neq \{1, 3\}$$

با جدول تعیین علامت.

$$(-\infty, -4] \cup (1, +\infty) - \{3\}$$

