

الف) $\begin{cases} x_1^2 = 2x^2 + x \\ x_2^2 = 2x^2 + x \end{cases} \rightarrow x_1^2 = x_2^2 \rightarrow x_1 = x_2$ تابع است.

د) $x = \cos y \xrightarrow{y=0} K\pi + \frac{\pi}{2}$

تابع نیست $\rightarrow (90^\circ, 180^\circ)$

ب) $|y| + x^2 = x + 2 \xrightarrow{x=1} |y| = 1 \rightarrow y = \pm 1$ تابع نیست.

ج) $\sqrt{x-4} + \sqrt{y-2} = 0 \rightarrow \sqrt{x-4} = 0 \rightarrow x=4 / \sqrt{y-2} = 0 \rightarrow y=2$ تابع است.

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

د) $y = \frac{x+4}{x^2-4x^2}$

$x^2(x^2-4) = x^2(x-2)(x+2)$

$x^2 = 0 \rightarrow x = 0$ $D_f = \mathbb{R} - \{-2, 0, 2\}$

$x-2 = 0 \rightarrow x = 2$

$x+2 = 0 \rightarrow x = -2$

ب) $y = \frac{x+4}{x^2-4x+4} \rightarrow \Delta = b^2 - 4ac = (-4)^2 - 4 \cdot 1 \cdot 4 = -16$ $D_f = \mathbb{R}$

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

الف) $y = \sqrt{4-x} + \sqrt{x-2}$ $4-x \geq 0 \rightarrow x \leq 4$
 $x-2 \geq 0 \rightarrow x \geq 2$

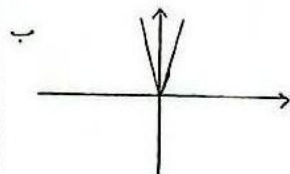
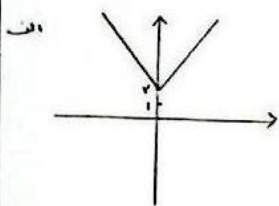
$D_f = [2, 4]$

ج) $y = \frac{\sqrt{x-2}}{x-4}$ $x-2 \geq 0 \rightarrow x \geq 2$
 $x-4 = 0 \rightarrow x = 4$

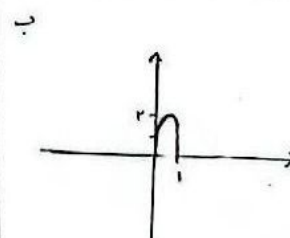
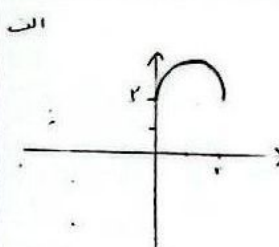
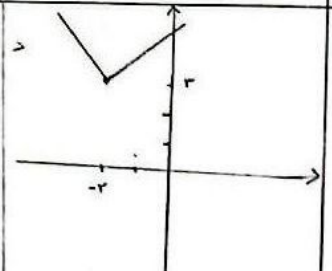
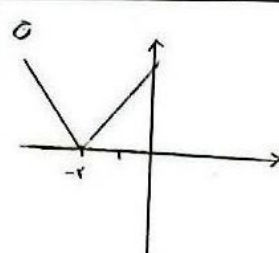
$D_f = [2, +\infty) - \{4\}$

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

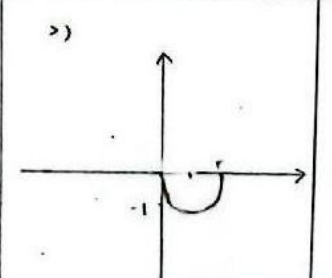
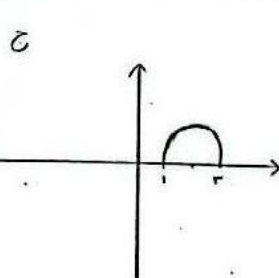
د) $y = \frac{3x+3}{|x|+x^2}$ $|x|+x^2 = 0 \rightarrow x=0$
 $D_f = \mathbb{R} - \{0\}$



چون $|x|$ در ۲ ضرب می شود
دشوار فلز را نیز ضرب می شود



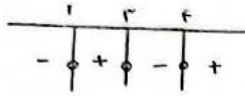
چون $f(x)$ در ۲ ضرب شده دشوار
دشوار فلز را نیز ضرب می شود



$$الف) y = (x-2)(x-3)(x-4)$$

$$x-2=0 \quad x-3=0 \quad x-4=0$$

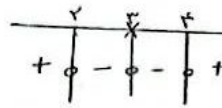
$$\boxed{x=2} \quad \boxed{x=3} \quad \boxed{x=4}$$



$$ب) y = (x-2)(x-3)^2(x-4)$$

$$x-2=0 \quad x-3=0 \quad x-4=0$$

$$\boxed{x=2} \quad \boxed{x=3} \quad \boxed{x=4}$$

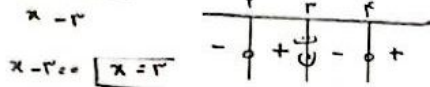


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$$x-2=0 \quad x-4=0$$

$$\boxed{x=2} \quad \boxed{x=4}$$

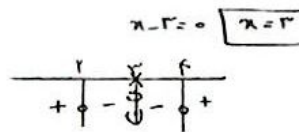
$$الف) y = \frac{(x-2)(x-4)}{x-3}$$



$$x-2=0 \quad x-4=0$$

$$\boxed{x=2} \quad \boxed{x=4}$$

$$ب) y = \frac{(x-2)(x-4)}{(x-3)^2}$$



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$$الف) y = \frac{x^2 - 3x + 2}{x-3} \rightarrow \text{برای } x-3 \text{ بخش پذیری دارد}$$

$$x-3=0$$

$$x=3$$



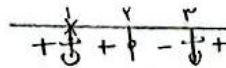
$$ب) y = \frac{x^2 - 3x + 2}{x^2 - 4x + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)}$$

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

$$(x^2 - 4x + 3) = (x-1)(x-3)$$

$$x-1=0 \quad x-3=0$$

$$\boxed{x=1} \quad \boxed{x=3}$$



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

$$\Delta = b^2 - 4ac = 1 - 4 = -3 < 0$$

هیچ ریشه حقیقی ندارد

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

$$\Delta = b^2 - 4ac = 9 - 4 = 5 > 0$$

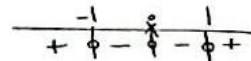
دو ریشه حقیقی دارد

$$\Delta = b^2 - 4ac = 4 - 4 = 0$$

یک ریشه حقیقی دارد

$$x=0 \quad x=1 \quad x=-1$$

$$\boxed{x=0} \quad \boxed{x=1} \quad \boxed{x=-1}$$

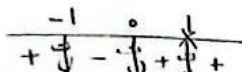


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$$الف) y = \sqrt{\frac{x^2 - 1}{x - 2}} \rightarrow \frac{x^2 - 1}{x - 2} \geq 0$$

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

$$\boxed{x=0} \quad \boxed{x=1} \quad \boxed{x=-1}$$



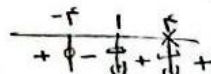
$$D_f = (-\infty, -1) \cup (0, 1) \cup (1, +\infty)$$

$$ب) y = \sqrt{\frac{x^2 - 14}{x^2 - 4x + 4}}$$

$$\frac{x^2 - 14}{x^2 - 4x + 4} \geq 0$$

$$(x-2)(x+2) \geq 0$$

$$\boxed{x=2} \quad \boxed{x=-2}$$



$$D_f = (-\infty, -2] \cup [2, +\infty)$$

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