

①

الف) $(x-9)(x+4)=0$

$x=9, -4 \div 4 \rightarrow \boxed{\frac{3}{1}, -\frac{1}{3}}$

ب) $(x-9)(x+1)=0$

$x=9, -1 \div 3 \rightarrow \boxed{3, -\frac{1}{3}}$

ج) $(x-6)(x+2)=0$

$x=6, -2 \div 4 \rightarrow \boxed{\frac{-1}{2}, \frac{3}{2}}$

د) $(x-1)(x+3)=0$

$x=1, -3 \div 2 \rightarrow \boxed{4, -\frac{3}{2}}$

②

الف) $(x-7)(x+2)=0$

$x=7, -2$

ب) $(x+2)(x+3)=0$

$x=-2, -3 \div 2 \rightarrow \boxed{-1, -\frac{3}{2}}$

ج)

$\Delta = 4 - 12 = -8$

$\Delta < 0 \rightarrow \boxed{\text{ریشه ندارد}}$

د) $\Delta = 9 + 28 = 37$

$x = \frac{-3 \pm \sqrt{37}}{4}$

③

$\theta^2 = \{(2,2)(2,3)(3,2)(3,3)\}$

$AB = \{\cancel{(1,1)}\cancel{(1,2)}\cancel{(1,3)}\cancel{(1,4)}\cancel{(2,1)}\cancel{(2,2)}\cancel{(2,3)}\cancel{(2,4)}\cancel{(3,1)}\cancel{(3,2)}\cancel{(3,3)}\cancel{(3,4)}\}$

$= \{(1,2)(1,3)\}$

④

الف)

$m^2 = m + 5$

$m^2 - m - 5 = 0$

$(m-2)(m+1)=0$

$m=2, -1$

$(2,1)(2,4) \rightarrow \boxed{\text{تابع است}}$

$\{(3,1)(2,1)(-3,-1)(-2,-1)\}$

$\downarrow$
 $\boxed{\text{تابع نیست}}$

ب)

$m^2 - m - 2 = 0$

$m = -1, 2$

$\rightarrow \boxed{\text{تابع نیست}}$

$(-1,3)(-1,4) \quad (2,1)(2,4)$

$$a^2 - 3a + 2 = 0$$

$$(a-1)(a-2) = 0$$

$$a = 1, 2$$

$$a=1 \rightarrow \{(1,1) \text{ ~~(1,0)~~}\} \times$$

$$a=2 \rightarrow \{(1,4) \text{ ~~(4,1)~~}\} \checkmark \rightarrow \boxed{\text{تابع هست}}$$

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$$ab = ? \rightarrow 1 \times -1 = \boxed{-4}$$

$$\left. \begin{array}{l} x=2 \rightarrow 2a+b=1 \\ x=1 \rightarrow a+b=0 \end{array} \right\} \begin{array}{l} a=1 \\ b=-1 \end{array}$$

✓

$$2k-3 = f-3k$$

$$5k = 7$$

$$\boxed{k = \frac{7}{5}}$$

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الف)

$$\left. \begin{array}{l} ay^3 + by = 0 \\ ay^3 - by = 0 \end{array} \right\} \begin{array}{l} \rightarrow \text{تابع هست} \\ \rightarrow \text{تابع نیست} \end{array} \rightarrow \boxed{\text{تابع نیست}}$$

$$\text{ج) } x=110 \rightarrow \cos_{110} = -1$$

$$\sqrt{2} = |y| \rightarrow \boxed{\text{تابع نیست}}$$

$$y = \pm \sqrt{2}$$

$$\text{ب) } |y| = -|x| + 3 \xrightarrow{x=0} |y| = 3$$

$$\boxed{\text{تابع نیست}} \leftarrow y = \pm 3$$

$$\text{د) } y^2 + (x+1)^2 = 0 \rightarrow \boxed{\text{تابع هست}}$$

نگ نقطه ۱۰

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$$\left. \begin{array}{l} \sqrt[3]{y_1} = -x^2 + 2x - 2 \\ \sqrt[3]{y_2} = -x^2 + 2x - 2 \end{array} \right\} y_1 = y_2 \rightarrow \boxed{\text{تابع هست}}$$

همواره بزرگتره

$$\text{ب) } y_1^3 + 2y_1 = y_2^3 + 2y_2 \quad (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2) = 0 \rightarrow \boxed{\text{تابع هست}}$$

$$y_1^3 - y_2^3 + 2y_1 - 2y_2 = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1y_2 + y_2^2 + 2)(y_1 - y_2) = 0$$

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$$\boxed{\text{تابع نیست (الف)}}$$

$$x=\pi \rightarrow \pi \sin y = 0$$

$$\sin y = 0$$

$$y = \pi, 2\pi, \dots$$

$$\text{ب) } \frac{x}{y} + \frac{y}{x} + 2\sqrt{\frac{xy}{xy}} = 4$$

$$a + \frac{1}{a} \geq 2 \rightarrow a = 1$$

~~$$\frac{x}{y} + \frac{y}{x} = 2$$~~

~~$$\frac{x}{y} = 1$$~~

~~$$\frac{x}{y} = 1$$~~

~~$$\rightarrow \boxed{\text{تابع هست}}$$~~