

$$x_5 = 2 \rightarrow \frac{-1}{2a-2} = 2 \Rightarrow 2a-2 = -1$$

$$a = \frac{3}{2}$$

$$y = -\frac{1}{2}x^2 + x + 3 \Rightarrow -x^2 + 2x + 6 = 0$$

$$(x-4)(x+2) = 0$$

$$x = 4 \quad \checkmark \quad x = -2 \quad \times$$

۱

$$f(x) = mx^2 - 2x + m$$

$$\begin{array}{c|c|c|c} x & x_1 & x_2 & \\ \hline f(x) & - & + & - \end{array}$$

$$a < 0$$

$$\frac{c}{a} = \frac{m}{m} = 1 \Rightarrow \frac{c}{a} > 0 \rightarrow \text{دور شده هم علامت}$$

$$\Rightarrow \begin{cases} a < 0 \rightarrow c < 0 \\ m < 0 \end{cases}$$

$$\Delta > 0 \rightarrow 4 - 4m^2 \geq 0 \rightarrow -\frac{1}{2} \leq m \leq \frac{1}{2}$$

$$\left\{ -\frac{1}{2} \leq m < 0 \right.$$



۲

$$\alpha = \frac{3-\sqrt{5}}{2}, \beta = \frac{3+\sqrt{5}}{2}$$

$$\Rightarrow \alpha\beta = \frac{9-5}{4} = \frac{1}{4}$$

$$\alpha + \beta = 3$$

$$\left. \begin{array}{l} x^2 - 3x + p = 0 \\ x^2 - 2x + \frac{1}{4} = 0 \end{array} \right\}$$

$$x^2 - 2x + \frac{1}{4} = 0$$

۳

$$2x^2 - 8x + m + 2 = 0, \alpha < \beta \Rightarrow \alpha + \beta = 4$$

$$2\alpha^2 + 2\beta^2 = 12$$

$$\alpha\beta = \frac{m+2}{2}$$

$$+ 2\alpha^2 - 8\alpha + m + 2 = 0$$

$$+ 2\beta^2 - 8\beta + m + 2 = 0$$

$$\frac{2(\alpha^2 + \beta^2) - 8(\alpha + \beta) + 2m + 4}{5 - 2p = 12m - 2} = 0 \Rightarrow 32 - 2m - 8 - 12 = 2m + 4 = 0$$

$$m = -2$$

۴

$$y = a(x - x_5)^2 + y_5$$

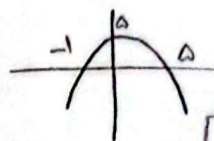
$$y = a(x - 2)^2 + 9 \xrightarrow{x=0} 0 = 4a + 9 \rightarrow a = -1$$

$$\left\{ \begin{array}{l} y = -(x-2)^2 + 9 \\ y = -x^2 + 4x + 5 \end{array} \right.$$

$$-x^2 + 4x + 5 = 0$$

$$-x^2 + 4x + 5 = 0$$

$$(x-5)(x+1) = 0$$



$$-1 < x \leq 5$$

۵

$$\alpha x^r - v x + q\beta = 0$$

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{-r + \frac{r}{r}}{-r \times \frac{1}{r}} = \frac{-\frac{r}{r}}{-r} = \frac{v}{r}$$

$$\alpha + \beta = \frac{v}{\alpha}$$

$$\alpha\beta = \frac{q\beta}{\alpha} \rightarrow \alpha^r\beta = q\beta \quad \begin{cases} \alpha = -r: -r + \beta = -\frac{v}{r} \Rightarrow \beta = \frac{r}{r} \checkmark \\ \alpha = r: r + \beta = \frac{v}{r} \Rightarrow \beta = -\frac{r}{r} \times \end{cases}$$

6

$$x^r + m x - r m = 0 \Rightarrow \alpha + \beta = -m$$

$$\alpha^r - m\beta = 1$$

$$\alpha^r + m\alpha - r m = 0 \rightarrow \alpha^r = r m - m\alpha$$

$$\begin{cases} r m - m\alpha - m\beta = 1 \\ r m - m(\alpha + \beta) = 1 \\ -m = 1 \end{cases}$$

$$m = -1: x^r - x + 1 = 0 \quad \Delta < 0 \quad \times$$

$$m = r: x^r + r x - r = 0 \quad \Delta > 0 \quad \checkmark$$

$$r m + m r + 1 = 0$$

$$(m + r)(m - r) = 0$$

$$\rightarrow \frac{-b}{a} = \frac{r}{1} = -r \Rightarrow \boxed{\alpha + \beta = -r}$$

7

$$f(x) = m x^r + \xi x + \frac{m}{r} + v$$

$$y_s = \frac{-\Delta}{\xi a} \Rightarrow 1 = \frac{-(14 - r m^r - r \Lambda m)}{\xi m} \Rightarrow r m^r + r \Lambda m - 14 = r m^r + r \Lambda m$$

$$m = -r \rightarrow y = -r x^r + \xi x + 4 \rightarrow x = r \rightarrow \boxed{x = r}$$

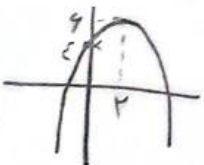
$$m = \xi \rightarrow y = \xi x^r + \xi x + 4$$

$$\Delta < 0 \quad \times$$

$$r m^r - \xi m - 14 = 0$$

$$m < -r$$

8



$$y = a(x - x_s)^r + y_s$$

$$y = a(x - r)^r + 4$$

$$x = 0, y = 1$$

$$\begin{cases} \xi a + 4 = 1 \\ a = -\frac{1}{r} \end{cases}$$

$$y = -\frac{1}{r}(x - r)^r + 4 \rightarrow y = -\frac{1}{r}x^r + x + \xi$$

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta} = \frac{r}{-1} = \boxed{-\frac{1}{\xi}}$$

9

$$x^r(\xi a + \xi)x + r a r + 4 a + r = 0 \xrightarrow{x=r} \xi - 1 a - 1 + r a r + 4 a + r = 0$$

$$r a^r - r a - 1 = 0 \rightarrow \frac{r \pm \xi}{r \times r} \quad \begin{cases} a = 1 \\ a = -\frac{1}{r} \end{cases}$$

$$a = 1 \rightarrow x^r - 1 x + 1 r = 0 \rightarrow (x - r)(x - 4) = 0 \rightarrow \boxed{x = 4}, x = r$$

$$a = -\frac{1}{r} \rightarrow x^r - \frac{1}{r} x + \frac{\xi}{r} = 0 \rightarrow \boxed{x = \frac{r}{r}}, x = r$$

10