

$$y = -x^2 + bx + 3$$

$$\max = v \rightarrow y_{\max} = \frac{-\Delta}{4a} = \frac{-(b^2 - 4ac)}{4a} = \frac{-(b^2 + 12)}{-4} = v \rightarrow b^2 + 12 = 28$$

$$b = ? \Rightarrow b^2 = 16 \Rightarrow b = \pm 4$$

الف) $f(x) = x^2 + 2x^2 + 3 \xrightarrow{\text{تغییر متغیر}} x^2 = t \rightarrow f(t) = t^2 + 2t + 3 \rightarrow t = \frac{-2 \pm \sqrt{4 - 12}}{2}$

$$\Rightarrow \Delta = b^2 - 4ac = 4 - 12 < 0 \rightarrow \text{این معادله فاقد ریشه است.}$$

ب) $f(x) = (5 - x^2)^2 - 2(5 - x^2) - 15 \xrightarrow{\text{تغییر متغیر}} 5 - x^2 = t \rightarrow f(t) = t^2 - 2t - 15$

ساده کردن $\rightarrow (t - 5)(t + 3) \rightarrow t \begin{cases} t = -3 \rightarrow 5 - x^2 \rightarrow x^2 - 5 = 0 \rightarrow x = \pm \sqrt{5} \\ t = 5 \rightarrow 5 - x^2 \rightarrow x^2 + 1 = 0 \rightarrow x^2 = -1 \text{ غلط } \end{cases}$

$$x^2 - 14x + m = 0 \rightarrow \begin{cases} S = \alpha + \beta = -\frac{b}{a} = \frac{14}{1} = 14 \\ P = \alpha \cdot \beta = \frac{c}{a} = \frac{m}{1} \end{cases}$$

α و $\alpha + 2 = \beta$

$m = ? \rightarrow \alpha + \beta = 14 = 2\alpha + 2 \rightarrow 2\alpha = 12 \rightarrow \alpha = 6 \rightarrow \beta = \alpha + 2 = 8$

$\alpha = ?$

$\beta = \alpha + 2 = ? \Rightarrow P = \alpha \cdot \beta = 6 \cdot 8 = 48 = \frac{m}{1} \Rightarrow m = 48$

$$x^2 - 4x + m - 1 = 0 \rightarrow \begin{cases} \alpha + \beta = 4 \\ \alpha \beta = m - 1 \end{cases} \xrightarrow{\text{حساب کردن با تستی}} \alpha = \frac{\beta}{2} + 2$$

$m = ? \Rightarrow \alpha + \beta = \beta + \frac{\beta}{2} + 2 = 4 \rightarrow \frac{3}{2}\beta = 2 \rightarrow \beta = \frac{4}{3}$

$\alpha \beta = \beta \left(\frac{\beta}{2} + 2 \right) = \frac{\beta^2}{2} + 2\beta = \frac{m-1}{1} \xrightarrow{\beta = \frac{4}{3}} \frac{0}{2} + 2(0) = 0 = \frac{m-1}{1} \rightarrow m = 1$

$$-mx^2 + 4x + m^2 - 2 = 0 \rightarrow P = \frac{c}{a} = \frac{m^2 - 2}{-m} = 1 \rightarrow m^2 + m - 2 = 0$$

$\alpha = \alpha$
 $\beta = \frac{1}{\alpha} \rightarrow P = \alpha \cdot \beta = \alpha \times \frac{1}{\alpha} = 1$

$m = \frac{-1 \pm \sqrt{1 + 8}}{2} = \frac{-1 \pm 3}{2}$

$\Rightarrow m = -2 \rightarrow 2x^2 + 4x + 2 \rightarrow \Delta = 16 - 16 = 0 \rightarrow \text{یک ریشه} \rightarrow \text{غلط}$

$\Rightarrow m = 1 \rightarrow -x^2 + 4x - 1 \rightarrow \Delta = 16 - 4 = 12 > 0 \rightarrow \text{دو ریشه} \rightarrow \text{درست} \rightarrow m = 1$

$$x^2 - mx + r = 0 \rightarrow \begin{cases} \alpha + \beta = m \\ \alpha \cdot \beta = r = p \end{cases}$$

$$\alpha \beta = r$$

$$m = ?$$

$$\rightarrow \begin{cases} \alpha = \frac{q}{r} \\ \beta = \frac{f}{r} \end{cases} \rightarrow m = \alpha + \beta = \frac{q}{f} + \frac{f}{r} = \frac{rv + 14}{12} = \frac{fv}{12}$$

$$\alpha \left(\frac{f}{r} \right)^r = f \rightarrow \alpha = \frac{f}{\frac{14}{q}} = \frac{q}{f}$$

6

$$x^2 - fx + m = 0 \rightarrow \begin{cases} \alpha + \beta = f \\ \alpha \beta = m \end{cases}$$

$$\alpha = \alpha$$

$$\beta = r\alpha$$

$$m = ?$$

$$\alpha \beta = r\alpha^r \rightarrow r\alpha^r = r(1)^r = r = m$$

$$\alpha + \beta = f\alpha = f \rightarrow \alpha = 1$$

7

$$x^2 - vx + r = 0$$

$$\alpha = \alpha$$

$$\alpha^r = (q)^3 \rightarrow \alpha^r + \frac{1}{\alpha^r} = \left(\alpha + \frac{r}{\alpha} \right)^r - 4\alpha - \frac{1r}{\alpha} = \left(\alpha + \frac{r}{\alpha} \right)^r - 4\left(\alpha + \frac{r}{\alpha} \right)$$

$$\alpha^r + \frac{1}{\alpha^r} = f \rightarrow \alpha + \frac{r}{\alpha} = \frac{\alpha^r + \frac{1}{\alpha^r}}{\alpha} = \frac{v\alpha}{\alpha} = v$$

$$\Rightarrow \left(\alpha + \frac{r}{\alpha} \right)^r - 4\left(\alpha + \frac{r}{\alpha} \right) = (v)^r - 4(v) = rfr - fr = r|f|$$

8

$$h(t) = -10t^2 + \omega_0 t$$

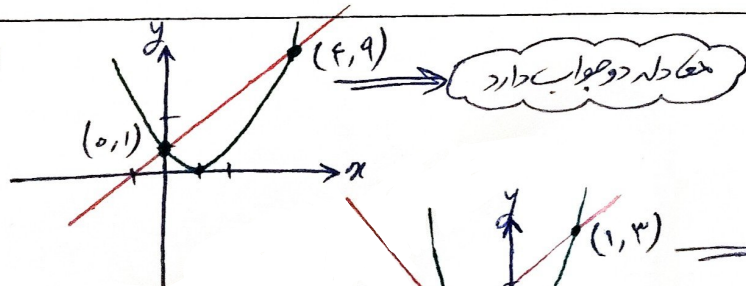
$$h_{max} = ? \rightarrow h_{max} = \frac{-\Delta}{4a} = \frac{-(b^2 - 4ac)}{4a} = \frac{-(2\omega_0^2 - 0)}{4 \cdot -10} = \frac{2\omega_0^2}{40} = \frac{\omega_0^2}{20}$$

$$t_{max} = ?$$

$$\rightarrow h = 0 \rightarrow -10t^2 + \omega_0 t = 0 \rightarrow \omega_0 t = 10t^2 \rightarrow t = \frac{\omega_0}{10}$$

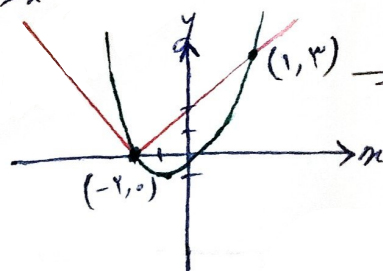
9

$$(a) (m-1)^2 = 2x+1$$



محل دو جواب دارد

$$(b) x^2 + 2x = |x+2|$$



محل دو جواب دارد

10