

$$3x^2 - ax + 2 = 0$$

$$3a, a \rightarrow p = \frac{c}{a} = \frac{2}{3} \text{ و } 3a^2 \Rightarrow a^2 = \frac{4}{9} \text{ و } a = \frac{2}{3} \text{ و } a = -\frac{2}{3}$$

$$5 = \frac{-b}{a} = \frac{a}{3} \text{ و } 5a \rightarrow \textcircled{1} 3\left(\frac{2}{3}\right) = \frac{a}{3}, a = 1, \textcircled{2} 3\left(-\frac{2}{3}\right) = \frac{a}{3} \text{ و } a = -1$$

$$a_1 - a_2 = 1 - (-1) = 2$$

$$\sqrt{\frac{1}{\alpha}} + \sqrt{\frac{1}{\beta}} = \omega \xrightarrow{\text{مربع کردن}} \frac{1}{\alpha} + \frac{1}{\beta} + 2\sqrt{\frac{1}{\alpha\beta}} = \omega^2 \quad \frac{\beta + \alpha}{\alpha\beta} + 2\sqrt{\frac{1}{\alpha\beta}} = \omega^2$$

$$5 = \frac{m+1}{m^2}, p = \frac{1}{m^2} \rightarrow \frac{m+1}{\frac{1}{m^2}} + 2\sqrt{\frac{1}{\frac{1}{m^2}}} = m+1 + 2(1) = \omega^2 \Rightarrow m = -1$$

$$m^2 + 2m + 2 = 0 \xrightarrow{m=-1} -1 + 2 + 2 = 3 \Rightarrow p = \frac{c}{a} = 3$$

$$3x^2 + 4x - 9x - 2 = 0 \xrightarrow{\text{معادله را ساده کنیم}} 3x^2 - 5x - 2 = 0 \quad \alpha\beta = x_1 x_2 = \frac{-(-2)}{3} = \frac{2}{3} \text{ و } \alpha + \beta = -\frac{5}{3} \Rightarrow -x_1 x_2 = \frac{1}{3}, x_1 x_2 = -\frac{1}{3}$$

$$\alpha + \beta + x_1 x_2 = -\frac{5}{3} - \frac{1}{3} = -2 \text{ و } \alpha + \beta = -\frac{5}{3} \Rightarrow 1 - \frac{1}{3} = -\frac{K}{3}, \frac{2}{3} = -\frac{K}{3} \Rightarrow K = -2$$

$$5 = \alpha + \beta = -4, p = \alpha\beta = a$$

$$3\alpha^2 + 2\beta^2 + 12\sqrt{\alpha\beta} + 18 = 0 \rightarrow \alpha^2 + 2(\alpha + \beta)^2 + 12\sqrt{\alpha\beta} + 18 = 0 / \alpha^2 + \beta^2 + 2(\alpha + \beta)^2 - 2\alpha\beta = 34 - 2a$$

$$x = \frac{-4 \pm \sqrt{16 - 4a}}{2} = -2 \pm \sqrt{4 - a} \quad \alpha < \beta \rightarrow \alpha = -2 - \sqrt{4 - a}, \beta = -2 + \sqrt{4 - a} \Rightarrow \alpha^2 = (-2 - \sqrt{4 - a})^2$$

$$2(\alpha^2 + \beta^2) + \alpha^2 = 12\sqrt{\alpha\beta} + 18 \rightarrow 2(11 - a + 4\sqrt{4 - a}) + 11 - a + 4\sqrt{4 - a} = 12\sqrt{4 - a} + 18 \rightarrow 9 - 2a = 18 \Rightarrow a = -\frac{9}{2}$$

$$4\sqrt{4 - a} = 12\sqrt{4 - a} \rightarrow \sqrt{4 - a} = 3\sqrt{4 - a} \quad \textcircled{a=1} \quad a = 1$$

$$5 = \frac{-b}{a} = v, p = \frac{c}{a} = \omega$$

$$2p^2 - 3sp + 2s \rightarrow 2(-\omega)^2 - 3(v)(-\omega) + 2(v) = 149$$

$$\begin{aligned}
 & \gamma \alpha^2 - \alpha x + b = 0 \rightarrow \alpha, \beta \quad / \quad \gamma \alpha'^2 + 0x - 4 = 0 \rightarrow \alpha', \beta' \quad \alpha = \alpha' + 0.1\omega, \beta = \beta' + 0.1\omega \\
 & S = \frac{a}{\gamma} \quad P = \frac{b}{\gamma} \quad S = \frac{a}{\gamma a} \quad P = -4 \\
 & \alpha + \beta = \alpha' + \beta' + 1 \rightarrow \frac{a}{\gamma} = \frac{-a}{\gamma a} + 1 = \frac{1}{\gamma} \quad ; \quad a = 1 \\
 & \alpha\beta = \frac{b}{\gamma} = -4 \Rightarrow b = -4 \quad \left[\frac{ab}{\gamma} \right] = \left[\frac{-4}{\gamma} \right] = -4
 \end{aligned}$$

6

$$\begin{aligned}
 & a x^2 - a x - b = 0 \rightarrow S = \frac{-b}{a} = 1 \rightarrow \alpha + \beta = 1, \alpha\beta = -1 \\
 & \gamma, \beta^2 + \gamma(1-\beta)^2 - \gamma, \beta = 1 \rightarrow \gamma, \beta^2 + \gamma, \beta^2 - 2\gamma, \beta + \gamma = 1 \rightarrow 4, \beta^2 - 4, \beta + 4 = 0 \quad \text{و } S=1, P=\frac{1}{\gamma} \\
 & \alpha\beta = \frac{b}{a} = \frac{1}{\gamma} \Rightarrow \frac{b}{a} = \frac{1}{\gamma} \\
 & \text{اختلاف} = \frac{\sqrt{\Delta}}{|a|} = \frac{\sqrt{(-a)^2 - 4a(-b)}}{|a|} = \frac{\sqrt{a^2 - 4ab}}{|a|} = \sqrt{1 + 4\frac{b}{a}} = \sqrt{1 + 4(-\frac{1}{\gamma})} = \sqrt{1 - \frac{4}{\gamma}} = \sqrt{\frac{\gamma - 4}{\gamma}} = \frac{\sqrt{\gamma - 4}}{\sqrt{\gamma}}
 \end{aligned}$$

7

$$\begin{aligned}
 & x^2 - (a+1)x + a = 0 \quad n, n+1 \\
 & \text{مجموع ریشه ها} = n + n+1 = 2n+1, \alpha + \beta = a+1 \Rightarrow a+1 = 2n+1 \Rightarrow a = 2n \\
 & \text{ضرب ریشه ها} = n(n+1) = n^2 + n, \alpha\beta = a \Rightarrow a = n^2 + n = 3 \\
 & \left. \begin{aligned} & n^2 - (2n+1)n + a = 0 \Rightarrow 2n, 2n+1 \\ & \text{مجموع ریشه ها} = 4n+1, \alpha + \beta = 3a+1 \Rightarrow 4n+1 = 10, n=2 \\ & \text{ضرب ریشه ها} = 4n(n+1) = 4 \times 2 \times 3 = 24 \end{aligned} \right\} \begin{aligned} & n^2 + 2n = 2n+1, n=1 \\ & \Rightarrow a = 2+1 = 3 \end{aligned} \\
 & \text{اختلاف ریشه ها} = |24 - 3| = 21
 \end{aligned}$$

8

$$\begin{aligned}
 & \alpha + \beta = 1, \alpha\beta = -(1+m^2) \\
 & \alpha^2 + \beta^2 = S^2 - 2P \rightarrow 1 + 2(1+m^2) = 3 + 2m^2 \Rightarrow \text{برابر است } m=0 \\
 & \text{کمترین مقدار زمانی است که } m=0 \text{ و برابر 3 است} \\
 & \text{کمترین مقدار } \alpha^2 + \beta^2 \text{ با } m=0 \text{ می دهد } 3
 \end{aligned}$$

9

$$\begin{aligned}
 & (x, y) \quad (-\omega, y) \quad \alpha^2 + \beta^2 = \omega \quad y = a(x - x_1)(x - x_2) \\
 & x = \frac{a+b}{\gamma} = 1 \Rightarrow \alpha + \beta = 2 \quad / \quad \alpha^2 + \beta^2 = \frac{(\alpha + \beta)^2}{\gamma} - 2\alpha\beta = \omega \Rightarrow -2\alpha\beta = \omega - 4 \Rightarrow \alpha\beta = \frac{4-\omega}{2} \\
 & \text{معادله بر مبنای } y \text{ در } x=0 \rightarrow y = a(0-\alpha)(0-\beta) = \alpha\beta / \gamma \Rightarrow y = \alpha(1-\alpha)(1-\beta) = 1 - \frac{(\alpha + \beta)}{\gamma} + \alpha\beta = \frac{1}{\gamma} \\
 & y = \frac{1}{\gamma} a \rightarrow a = \frac{1}{\gamma} \rightarrow y = \alpha\beta = \frac{1}{\gamma} \times \left(-\frac{1}{\gamma}\right) = -\frac{1}{\gamma^2}
 \end{aligned}$$

10