

$$y = 2x^2 + 2x + 5 \xrightarrow{a > 0} \min$$

$$x = \frac{-b}{2a} = \frac{-1}{2 \times 1} = -\frac{1}{2}$$

$$y = 2\left(-\frac{1}{2}\right)^2 + 2\left(-\frac{1}{2}\right) + 5 = 9 - 1 + 5 = -4$$

(الف)

مقیصات استریم: $\left| \begin{matrix} -3 \\ -4 \end{matrix} \right|$

(ب)

عرض از مبدأ:

$$y = -x^2 + 4x - 3 \xrightarrow{a < 0} \max$$

$$x = \frac{-b}{2a} = \frac{-4}{2 \times (-1)} = 2$$

$$y = - (2)^2 + 4(2) - 3 = -4 + 8 - 3 = 1$$

(الف)

مقیصات استریم: $\left| \begin{matrix} 2 \\ 1 \end{matrix} \right|$

(ب)

 $y = -x^2 + 4x - 3 = 0 \Rightarrow -x^2 + 4x - 3 = 0 \Rightarrow x^2 - 4x + 3 = 0 \Rightarrow (x-1)(x-3) = 0 \Rightarrow x = 1, 3$

$$\Delta = b^2 - 4ac = (-4)^2 - 4(1)(3) = 16 - 12 = 4$$

(الف) $4 - 12 > 0 \Rightarrow \frac{4}{1} > 12 \Rightarrow$

(ب) $4 - 12 = 0 \Rightarrow \frac{4}{1} = 12 \Rightarrow$

(ج) $4 - 12 < 0 \Rightarrow \frac{4}{1} < 12 \Rightarrow$

(د) $4 - 12 \geq 0 \Rightarrow \frac{4}{1} \geq 12 \Rightarrow$

دارای دو ریشه حقیقی

دارای یک ریشه حقیقی

فاصله ریشه حقیقی

معادله دارای ریشه است

(الف) $x^2 - 2x - 1 = 0 \Rightarrow x^2 - 2x - 1 + 2 = 2 \Rightarrow (x-1)^2 = 2 \Rightarrow x-1 = \pm\sqrt{2} \Rightarrow x = \frac{1+\sqrt{2}}{2}, \frac{1-\sqrt{2}}{2}$

(ب) $x^2 - x - 1 = 0 \Rightarrow x^2 - x - 1 + \frac{1}{4} - \frac{1}{4} = 0 \Rightarrow \left(x - \frac{1}{2}\right)^2 = \frac{5}{4} \Rightarrow x - \frac{1}{2} = \pm\sqrt{\frac{5}{4}} \Rightarrow x = \frac{1+\sqrt{5}}{2}, \frac{1-\sqrt{5}}{2}$

(الف) $x^2 - 2x - 1 = 0 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-2) \pm \sqrt{4 - (-4)}}{2 \times 1} = \frac{2 \pm \sqrt{8}}{2} = \frac{1 \pm \sqrt{2}}{1}$

(ب) $x^2 + x - 4 = 0 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm \sqrt{1 - (-16)}}{2 \times 1} = \frac{-1 \pm \sqrt{17}}{2}$

$$\text{الف) } x^2 - 11x + 1 = 0 \Rightarrow (x-1)(x-11) = 0 \Rightarrow x \in \begin{matrix} 1 \\ 11 \end{matrix} \checkmark$$

(2)

$$\text{ب) } x^2 + 3x - 4 = 0 \Rightarrow (x+4)(x-1) = 0 \Rightarrow x \in \begin{matrix} -4 \\ 1 \end{matrix} \checkmark$$

$$\text{الف) } \omega x^2 - 12x + 1 = 0 \Rightarrow x^2 - 12x + \frac{1}{\omega} = 0 \Rightarrow (x-1)(x-\omega) = 0 \Rightarrow x \in \begin{matrix} \frac{1}{\omega} \\ \omega = 1 \end{matrix} \checkmark$$

(2)

$$\text{ب) } 3x^2 - 10x + 1 = 0 \Rightarrow x^2 - 10x + \frac{1}{3} = 0 \Rightarrow (x-3)(x-1) = 0 \Rightarrow x \in \begin{matrix} \frac{1}{3} \\ \frac{1}{3} = 1 \\ \frac{1}{3} \end{matrix} \checkmark$$

$$\text{الف) } 2x^2 - 5x + 3 = 0 \Rightarrow x^2 - 5x + \frac{3}{2} = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow x \in \begin{matrix} \frac{3}{2} \\ \frac{3}{2} \\ \frac{3}{2} \end{matrix} \checkmark$$

$$\text{ب) } 2x^2 + 5x + 3 = 0 \Rightarrow x^2 + 5x + \frac{3}{2} = 0 \Rightarrow (x+2)(x+3) = 0 \Rightarrow x \in \begin{matrix} -\frac{3}{2} \\ -\frac{3}{2} \\ -\frac{3}{2} \end{matrix} \checkmark$$

(2)

$$\text{ج) } 2x^2 - 5x + 1 = 0 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-5) \pm \sqrt{25 - 4}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4} \checkmark$$

$$\text{د) } 4x^2 + 12x + 9 = 0 \Rightarrow x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-12 \pm \sqrt{144 - 144}}{2 \times 4} = \frac{-12 \pm 0}{8} = -\frac{3}{2} \Rightarrow \Delta = -9\omega = 0 \text{ ناقص ریشه حقیقی} \checkmark$$

$$\beta = \frac{-b}{a}, \rho = \frac{c}{a}$$

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

$$\text{الف) } S_1^2 - 2P = \left(\frac{-(-3)}{1}\right)^2 - 2\left(\frac{-2}{1}\right) = 9 + 4 = 13 \checkmark$$

(2)

$$\text{ب) } S_1^3 - 3SP = 3^3 - 3(3)(-2) = 27 + 18 = 45 \checkmark$$

$$\text{الف) } \begin{pmatrix} 1 \\ \omega \end{pmatrix} + \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \frac{1 \times 1}{1 \times 1} + \frac{1 \times \omega}{1 \times 1} = 1 + \omega = \omega \checkmark$$

(2)

$$\text{ب) } \begin{pmatrix} 1 \\ \omega \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \frac{1 \times \omega}{1 \times 1} - \frac{1 \times 1}{1 \times 1} = \omega - 1 = \omega \checkmark$$