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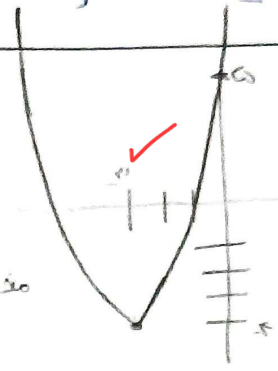
$$y = x^2 + 4x + 5$$

$$a > 0$$

$$\min \left| \frac{-b}{2a} = \frac{-4}{2} = -2 \right.$$

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

مقیاسات نقطه
 $\Rightarrow [-2]$



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$$y = -x^2 + 4x - 3$$

$$a < 0$$

$$\max \left| \frac{-b}{2a} = 2 \right.$$

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



برای یافتن نقاطی که x قطع می شود
 معادله را محاسبه می کنیم

$$b^2 - 4ac$$

$$16 - 4(-1)(-3) = 4$$

$$\frac{-b \pm \sqrt{4}}{2a} \Rightarrow \frac{-4 \pm 2}{-2} \Rightarrow \begin{matrix} 1 \\ 3 \end{matrix}$$

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$$2x^2 - 3x + a = 0 \quad \Delta > 0 \quad b^2 - 4ac \quad \left(\frac{-3}{2} \right)^2 - 4(2)(a) = 9 - 8a > 0$$

$$9 - 8a > 0 \quad 9 > 8a$$

$$\frac{9}{8} > a$$

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$$\Delta = 0 \quad \left(\frac{-3}{2} \right)^2 - 4(2)(a) = 9 - 8a = 0 \quad 9 = 8a$$

$$a = \frac{9}{8}$$

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$$\Delta < 0 \quad \left(\frac{-3}{2} \right)^2 - 4(2)(a) = 9 - 8a < 0 \quad 9 < 8a$$

$$a < \frac{9}{8}$$

$$\frac{9}{8} < a$$

$$\Delta \geq 0 \quad \left(\frac{-3}{2} \right)^2 - 4(2)(a) = 9 - 8a \geq 0 \quad 9 \geq 8a$$

$$a \geq \frac{9}{8}$$

$$\frac{9}{8} \leq a$$

در طرف معادله را ۲ می بینیم

$$x^2 - 2x - 1 = 0$$

$$x^2 - 2x + 1 = 2$$

$$(x-1)^2 = 2 \quad x-1 = \pm \sqrt{2}$$

$$x = \pm \sqrt{2} + 1$$

$$x = \frac{1}{2} + \sqrt{\frac{5}{4}} \Rightarrow \frac{1}{2} + \frac{1}{2}\sqrt{5}$$

$$\frac{1}{2}(1 + \sqrt{5})$$

$$x = \frac{1}{2} - \sqrt{\frac{5}{4}} \Rightarrow \frac{1}{2} - \frac{1}{2}\sqrt{5}$$

$$\frac{1}{2}(1 - \sqrt{5})$$

$$x^2 - x - 1 = 0$$

$$x^2 - x - 1 + \frac{5}{4} = \frac{5}{4}$$

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

$$x - \frac{1}{2} = \pm \sqrt{\frac{5}{4}}$$

$$x^2 - 2x - 1 = 0$$

$$\Delta = b^2 - 4ac \quad (-2)^2 - 4(1)(-1) = 4 + 4 = 8$$

$$\frac{-b \pm \sqrt{8}}{2a} \Rightarrow \frac{2 \pm \sqrt{8}}{2} \Rightarrow \frac{2 \pm 2\sqrt{2}}{2}$$

پس ریشه ها

$$\frac{1 + \sqrt{2}}{1} \quad \frac{1 - \sqrt{2}}{1}$$

$$x(1 + \sqrt{2})$$

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

$$\Delta = b^2 - 4ac$$

$$1 - 4(1)(-4) = 17 \Rightarrow \frac{-1 \pm \sqrt{17}}{2}$$

$$\frac{-1 + \sqrt{17}}{2} \quad \frac{-1 - \sqrt{17}}{2}$$

الف) $x^2 - 11x + 18 = 0$
 $(x-2)(x-9) = 0 \Rightarrow \begin{cases} x=2 \\ x=9 \end{cases}$ ✓

الف) ۲

ب) $x^2 + 3x - 18 = 0$

$(x+6)(x-3) = 0 \Rightarrow \begin{cases} x=-6 \\ x=3 \end{cases}$ ✓

ب) ۲

الف) $\omega x^2 - 12x + 9 = 0$

$x^2 - 12x + 9\omega \Rightarrow (x-3)(x-3\omega) = 0 \Rightarrow \begin{cases} x=3 \\ x=3\omega \end{cases}$ ✓
 $\omega = \frac{x}{3} \Rightarrow x = \frac{3}{\omega} = 1$

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ب) $x^2 - 10x + 21 = 0$

$x^2 - 10x + 21 = 0 \Rightarrow (x-3)(x-7) = 0 \Rightarrow \begin{cases} x=3 \\ x=7 \end{cases}$ ✓
 $x = \frac{3}{x} = 1$

الف) $2x^2 - 5x + 2 = 0$

$x^2 - 5x + 2 = 0 \Rightarrow (x-2)(x-1) = 0$

$x = \frac{2}{x} = 1$
 $x = \frac{5}{x} = 1$ ✓

ب) $2x^2 + 5x + 2 = 0$
 $x^2 + 5x + 2 = 0 \Rightarrow (x+2)(x+1) = 0$

$x = \frac{2}{x} = -1$
 $x = \frac{5}{x} = -1$ ✓

ج) $2x^2 - 5x + 1 = 0$

$\Delta = 25 - 4(2)(1) = 17$

$2\omega - 1 = 17$

$\frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow \frac{5 \pm \sqrt{17}}{4}$ ✓

د) $4x^2 + 7x + 9 = 0$

$\Delta = 49 - 4(4)(9) = -95$

$\frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow \frac{-7 \pm \sqrt{-95}}{8}$ ✗

چون Δ کمتر از صفر است
 این معادله فاقد ریشه حقیقی است.

حاصل ریشه ها: $r = \frac{-b}{a}$

حاصل ضرب ریشه ها: $p = \frac{c}{a}$

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

$\Delta > 0$ ✓

$\Delta = b^2 - 4ac$

$9 - 4(1)(-2) = 9 + 8 = 17$

$\frac{-b}{a} = \frac{3}{1} = 3$ $\frac{c}{a} = \frac{-2}{1} = -2$

$S^r - 2P = 3^2 - 2(-2) = 9 + 4 = 13$ ✓

الف) $S^r - 2P = 3^2 - 2(-2) = 9 + 4 = 13$ ✓

ب) $S^r - 2SP = (3)^2 - 2(3)(-2) = 9 + 12 = 21$ ✓

الف) $\binom{V}{\omega} + \binom{9}{2} = \frac{V!}{(V-\omega)! \times \omega!} = \frac{V \times \cancel{V} \times \omega!}{\cancel{V} \times \omega!} = 21 + 36 = 57$ ✓

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$\frac{9!}{(9-2)! \times 2!} = \frac{9 \times 8 \times \cancel{7!}}{\cancel{7!} \times 2} = 36$

ب) $\binom{9}{2} - \binom{7}{2} = \frac{9!}{2! \times 7!} - \frac{7!}{2! \times 5!} = \frac{9 \times 8 \times \cancel{7!}}{\cancel{7!} \times 2} - \frac{7 \times 6 \times \cancel{5!}}{\cancel{5!} \times 2} = 18 - 21 = -3$ ✓

$\binom{7}{2} = \frac{7!}{2! \times 5!} = \frac{7 \times 6 \times \cancel{5!}}{\cancel{5!} \times 2} = 21$