

الف) $y = x^2 - 4x + 7 \xrightarrow{\min} \text{ext} \quad \left| \begin{array}{l} -\frac{b}{2a} = \frac{4}{2} = 2 \\ y = \frac{-\Delta}{4a} = 3 \end{array} \right.$

ب) $y = -x^2 + 4x - 1 \xrightarrow{\max} \quad \left| \begin{array}{l} -\frac{b}{2a} = \frac{-4}{-2} = 2 \\ y = -(\frac{4}{2})^2 + 4(\frac{4}{2}) - 1 = 3 \end{array} \right.$

$2x^2 + (m+1)x + \frac{1}{2}m + 2 = 0$

الف) دوری بین ریشه ها $\rightarrow \Delta = b^2 - 4ac > 0 \rightarrow (m+1)^2 - 4(\frac{1}{2}m+2) = m^2 + 2m - 14 = m^2 - 2m - 15 > 0$

ب) یک ریشه منفی $\rightarrow \Delta = b^2 - 4ac = 0 \rightarrow m^2 - 2m - 15 = (m-5)(m+3) = 0 \rightarrow m < -3$

ج) فاقد ریشه حقیقی $\rightarrow \Delta < 0 \rightarrow (m-5)(m+3) < 0 \rightarrow m \in (-3, 5)$

د) دارای ریشه $\rightarrow \Delta > 0 \rightarrow (m-5)(m+3) > 0 \rightarrow m \in (-\infty, -3) \cup (5, +\infty)$

$y = (m-2)x^2 - 2(m+1)x + 10 \rightarrow m = 8$

الف) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

ب) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

ج) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

د) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

$y = (m-2)x^2 - 2(m+1)x + 10 \rightarrow m = 8$

الف) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

ب) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

ج) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

د) دوری بین ریشه ها $\rightarrow \Delta > 0 \rightarrow 4m^2 - 32m + 144 > 0$

$\frac{2x^2}{3} - (2\alpha x) + \frac{4}{3} = 0 \rightarrow \Delta = b^2 - 4ac = 4\alpha^2 - 4 = 4(\alpha^2 - 1) = -4C\alpha^2 > 0$

$\alpha^2 + C\alpha^2 = 1 \rightarrow \alpha^2(1+C) = 1$

$\alpha = \frac{1}{\sqrt{1+C}} = \frac{4}{3} > 0$

$\alpha = \frac{4}{3} > 0$

$\frac{2x^2}{3} - 2\alpha x + \frac{4}{3} \rightarrow x^2 - 2\alpha x + 2 \rightarrow (x-1)^2 \rightarrow x = 1$

$$f(x) = \frac{(x^m - x^{m-1})(x^m - x + a)}{1 - x^2} \rightarrow \text{مشتق = ؟}$$

$$f(x) = \frac{(x^m - x^{m-1})(x^m - x + a)}{(1-x)(1+x)} = -(x^{m+1})(x^m - a) = -x^{2m+1} + ax^{m+1}$$

$$\Rightarrow \text{ext } \left| \frac{y}{x} \right| \rightarrow y_{\max} = \frac{-a}{fa} = \frac{fac - b^2}{fa} = \frac{f(-4)(a) - 16}{-2f} = \frac{-120 - 144}{-2f} = \frac{264}{2f} = \frac{132}{f}$$

$$mx^2 - (m+1)x - 2 = 0 \rightarrow \begin{cases} S = \frac{m+1}{m} \\ P = -\frac{2}{m} \end{cases}$$

$$P \cdot S = a \cdot p + v \rightarrow x \left(\frac{m+1}{m} \right) = a \left(-\frac{2}{m} \right) + v \rightarrow \frac{x(m+1)}{m} = \frac{-10 + 6m}{m}$$

$$a^2 + b^2 = 5 \rightarrow S^2 - 2P \Rightarrow x(m+1) = 6m - 10 \rightarrow 6m - 14 \rightarrow m = 7$$

$$\Rightarrow \begin{cases} S = \frac{m+1}{m} = \frac{8}{7} \\ P = -\frac{2}{m} = -\frac{2}{7} \end{cases} \Rightarrow S^2 - 2P = \frac{64}{49} + \frac{4}{49} = \frac{68}{49}$$

$$x^2 - ax + 2 = 0 \rightarrow \begin{cases} S = a \\ P = 2 \end{cases}$$

$$\frac{f(a) + f(b)}{a \cdot b} = \frac{a^2 \times \frac{1}{a} + b^2 \times \frac{1}{b}}{a^2 \times \frac{1}{a} \times b^2 \times \frac{1}{b}} = \frac{f(a^2) + f(b^2)}{a^2 b^2} = \frac{f(a^2 + b^2)}{a^2 b^2} = \frac{f(a^2 + b^2)}{a^2 b^2}$$

$$P^2 = f \rightarrow \frac{f(a^2) + f(b^2)}{a^2 b^2} = \frac{f(a^2 + b^2)}{a^2 b^2} = \frac{f(a^2 + b^2)}{a^2 b^2} = \frac{(a^2 + b^2)^2 - 2ab(a^2 + b^2)}{a^2 b^2} = \frac{S^2 - 2SP}{a^2}$$

$$\Rightarrow \frac{120 - 2(2)(2)}{a^2} = \frac{112 - 8}{a^2} = \frac{104}{a^2} = 19$$

$$y_1 = ax^2 + bx + c \rightarrow \begin{cases} y = a \\ -2 = b \\ f = c \end{cases} \rightarrow \text{مشتق} = \frac{-b}{2a} = 5$$

$$y_2 = 2x + 10 \rightarrow f = c \rightarrow a = 2 \rightarrow f(a) + f(b) + f = 15 \rightarrow 2(2a + b) = 10$$

$$\Rightarrow ax^2 + bx + c = 2x + 10 \rightarrow \begin{cases} 2a + b = 5 \\ 2a = b \end{cases} \rightarrow 2a = b \rightarrow 2a = 5 \rightarrow a = \frac{5}{2}, b = 5$$

$$\begin{cases} 2a + b = 5 \\ 2a = b \end{cases} \rightarrow 2a = 5 \rightarrow \begin{cases} a = \frac{5}{2} \\ b = 5 \end{cases}$$

$$\text{مشتق} = \frac{-b}{2a} = \frac{-5}{2 \times \frac{5}{2}} = -1$$

$$y = 2x^2 + (m+1)x + m + 4$$

$$m = 5 \rightarrow \text{قطع کردن نمودار در نقطه} \rightarrow \Delta = 0$$

$$\Delta = b^2 - 4ac = (m+1)^2 - 4(2)(m+4) = 0$$

$$\Delta = b^2 - 4ac = (m+1)^2 - 4(2)(m+4) = 0 \rightarrow m^2 - 1m - 11 = m^2 - 1m - 11 = 0$$

$$\rightarrow m = \frac{1 \pm \sqrt{1 + 44}}{2} = \frac{1 \pm 7}{2} \rightarrow m = 4 \text{ or } m = -3$$

$$\frac{1+7}{2} = \frac{8}{2} = 4 \quad \frac{1-7}{2} = \frac{-6}{2} = -3$$