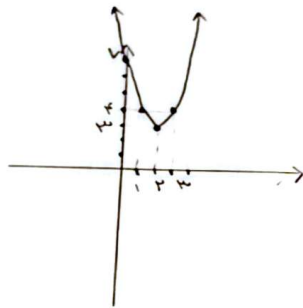


الف) $x^2 - 4x + 4$

$S \begin{cases} x_s = \frac{-b}{2a} = \frac{4}{2} = 2 \\ y_s = (2)^2 - 4(2) + 4 = 0 \end{cases}$

x	0	1	2	3
y	4	0	0	4

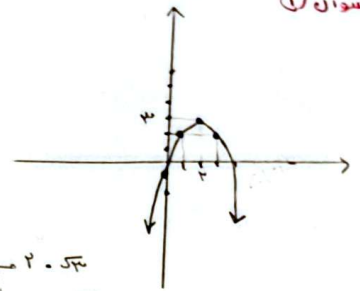


ب) $y = -x^2 + 4x - 1$

$S \begin{cases} x_s = \frac{-b}{2a} = \frac{4}{-2} = -2 \\ y_s = -(-2)^2 + 4(-2) - 1 = -9 \end{cases}$

x	0	1	2	3
y	-1	3	7	4

$x = \frac{-4 \pm \sqrt{16 - 4(-1)(-9)}}{-2} = \frac{-4 \pm \sqrt{20}}{-2} = \frac{-4 \pm 2\sqrt{5}}{-2} = 2 \pm \sqrt{5}$



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

الف) $\Delta > 0 \rightarrow b^2 - 4ac > 0 \rightarrow (m+1)^2 - 4(\frac{1}{2}m + 2) > 0$

$\begin{aligned} m^2 + 2m + 1 - 2m - 4 &> 0 \\ m^2 - 3 &> 0 \\ (m-\sqrt{3})(m+\sqrt{3}) &> 0 \end{aligned}$

$\begin{array}{c} -\sqrt{3} \quad \sqrt{3} \\ + \quad | \quad - \quad | \quad + \end{array}$

$m < -\sqrt{3} \text{ or } m > \sqrt{3}$

ب) $\Delta = 0 \rightarrow m^2 - 2m - 1 = 0$

$(m-\sqrt{3})(m+\sqrt{3}) = 0 \rightarrow m = \sqrt{3} \text{ or } m = -\sqrt{3}$

ج) $\Delta < 0 \rightarrow m^2 - 2m - 1 < 0$

$(m-\sqrt{3})(m+\sqrt{3}) < 0$

$\begin{array}{c} -\sqrt{3} \quad \sqrt{3} \\ + \quad | \quad - \quad | \quad + \end{array}$

$-\sqrt{3} < m < \sqrt{3}$

د) $\Delta > 0 \rightarrow m^2 - 2m - 1 > 0$

$\begin{array}{c} -\sqrt{3} \quad \sqrt{3} \\ + \quad | \quad - \quad | \quad + \end{array}$

$m < -\sqrt{3} \text{ or } m > \sqrt{3}$

یا مثبت
یا منفی

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

الف) $\Delta > 0 \rightarrow (-2m-2)^2 - 4(m-2)(10) > 0 \rightarrow 4m^2 + 8m + 4 - 40m + 80 > 0 \rightarrow 4m^2 - 32m + 84 > 0$

$m^2 - 8m + 21 > 0 \rightarrow \Delta < 0$

$S < 0 \rightarrow \frac{-b}{a} = \frac{2m+2}{m-2} < 0$

$\begin{array}{c} -1 \quad 2 \\ + \quad | \quad - \quad | \quad + \end{array}$

$-1 < m < 2$

$P > 0 \rightarrow \frac{c}{a} = \frac{10}{m-2} > 0 \rightarrow m-2 > 0$

$m > 2$

$(I) \cap (II) \rightarrow \emptyset$

مقدار مثبت یا منفی ندارد

ب) $\frac{c}{a} < 0 \rightarrow \frac{10}{m-2} < 0 \rightarrow m-2 < 0 \rightarrow m < 2$

$x_1 < 0 < x_2 \rightarrow x_1 + x_2 > 0 \rightarrow \frac{2m+2}{m-2} > 0$

$\begin{array}{c} -1 \quad 2 \\ + \quad | \quad - \quad | \quad + \end{array}$

$-1 < m < 2$

$(I) \cap (II) = \{-1 < m < 2\}$

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

الف) $\Delta < 0 \rightarrow (-2m-2)^2 - 4(m-2)(10) < 0 \rightarrow 4m^2 + 8m + 4 - 40m + 80 < 0 \rightarrow 4m^2 - 32m + 84 < 0$

ب) $x = -2 \rightarrow \frac{-b}{2a} = \frac{2(m+1)}{2(m-2)} = -2 \rightarrow m+1 = -2m+4$

$3m = 3 \rightarrow m = 1$

$\frac{y}{x} = (2 \sin \alpha)x + \frac{y}{x} = 0$

$\Delta > 0 \rightarrow 4 \sin^2 \alpha - 4 > 0 \rightarrow 4(\sin^2 \alpha - 1) > 0 \rightarrow -4 \cos^2 \alpha > 0 \rightarrow \cos^2 \alpha < 0 \rightarrow \cos^2 \alpha = 0 \rightarrow \cos \alpha = 0 \rightarrow \sin \alpha = \pm 1$

$\alpha = k\pi + \frac{\pi}{2}$

$\cos \alpha = 0 \rightarrow \sin \alpha = \pm 1 \rightarrow \frac{y}{x} = 2(\pm 1)x + \frac{y}{x} = 0$

$\Delta = 0 \rightarrow x = \frac{-b}{2a} = \frac{2 \sin \alpha}{2} = \sin \alpha$

$\sin \alpha = 1 \rightarrow \alpha = 2k\pi + \frac{\pi}{2}$

$\cos \alpha = 0 \rightarrow \sin \alpha = \pm 1 \rightarrow \alpha = k\pi + \frac{\pi}{2}$

$\alpha = \frac{\pi}{2}$

$x = \sin \alpha$

$$y = \frac{(x^2 - 2x - 1)(x^2 - 2x - 5)}{1 - x^2} = \frac{(x-1)(x+1)(x+1)(x-5)}{1-x^2} = \frac{(x^2-1)(x+1)(x-5)}{1-x^2} = \frac{-(1-x^2)(x+1)(x-5)}{1-x^2} = -(x+1)(x-5)$$

$$y = -4x^2 + 14x + 5 \rightarrow x_s = \frac{-b}{2a} = \frac{-14}{-8} = \frac{7}{4}$$

$$y_s = -4\left(\frac{7}{4}\right)^2 + 14\left(\frac{7}{4}\right) + 5 = \frac{9}{4}$$

$$mx^2 - (m+2)x - 2 = 0$$

$$x_s = \omega p + v$$

سوال ۷

$$x_s = \omega p + v$$

$$m\left(\frac{m+2}{m}\right) = \omega\left(\frac{2}{m}\right) + v \rightarrow m+2 = -10 + vm$$

$$19 = fm \rightarrow m = 19$$

$$-fx^2 - 9x - 2 = 0 \quad p = -\frac{1}{f}, s = \frac{2}{f}$$

$$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = s^2 - 2p = \left(\frac{2}{f}\right)^2 - 2\left(-\frac{1}{f}\right) = \frac{14}{f}$$

$$x^2 - \omega x + 2 = 0, \quad \frac{f\alpha + \beta\omega}{\alpha\beta^2} = ?$$

سوال ۸

$$\frac{f\alpha}{\omega\beta^2} + \frac{\beta\omega}{\omega\beta^2} = \frac{f\alpha}{\omega\beta^2} + \frac{\beta}{\alpha} \Rightarrow \frac{f\alpha}{\alpha^2} + \frac{\beta}{\omega} = \frac{\alpha^2}{\omega} + \frac{\beta}{\omega} = \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\omega(\alpha + \beta)}$$

$$S = \omega, p = 2$$

$$\alpha/\beta = 2 \rightarrow \beta = \frac{2}{\alpha} \rightarrow \omega/\beta^2 = \frac{2}{\alpha^2}$$

$$\frac{14\omega - 2}{\omega} = 19$$

$$y_1 = ax^2 + bx + c \xrightarrow{\text{موردی خاص از } x} c = 4$$

سوال ۹

$$y_2 = 2x + 10$$

$$\Rightarrow x = 1 \rightarrow fa + 2b + f = 14$$

$$fa + 2b = 10$$

$$10a = 10$$

$$a = 1, b = 3$$

$$\Rightarrow x = -3 \rightarrow 9a - 3b + f = 4$$

$$9a - 3b = 0$$

$$3a = b$$

$$y_1 = x^2 + 3x + 4$$

$$x_s = \frac{-b}{2a} = \frac{-3}{2}$$

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

$$y = x = g(x) \rightarrow x, y > 0$$

سوال ۱۵

برای محاسب بودن باید یک
نقطه اشتراک با شیب برابر داشته
باشد

$$\text{شرط اشتراک} \Rightarrow f(x) = g(x)$$

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

$$2x^2 + mx + m + 4 = 0$$

$$\Delta = 0 \Rightarrow m^2 - 4(2)(m+4) = 0$$

$$m^2 - 8m - 32 = 0$$

$$m = \frac{8 \pm \sqrt{64 + 128}}{2} = \frac{8 \pm 14}{2} \Rightarrow m_1 = 11, m_2 = -4$$

با توجه به اینکه اول که $x, y > 0$ در نظر می‌گیریم

$$\textcircled{1} m = 11 \rightarrow 2x^2 + 12x + 15 = 0 \rightarrow x^2 + 6x + 7.5 = 0 \rightarrow (x+3)^2 = 0 \rightarrow x = -3 < 0 \quad \text{غیر قابل قبول}$$

$$\textcircled{2} m = -4 \rightarrow 2x^2 - 4x + 4 = 0 \rightarrow x^2 - 2x + 2 = 0 \rightarrow (x-1)^2 = 0 \rightarrow x = 1 > 0 \quad \text{قبول}$$

$$m = -4$$