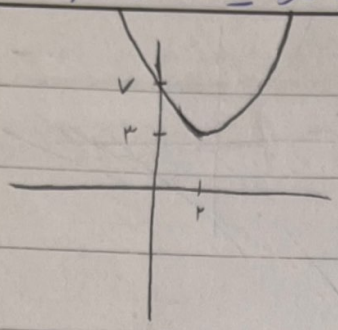
۱ـ

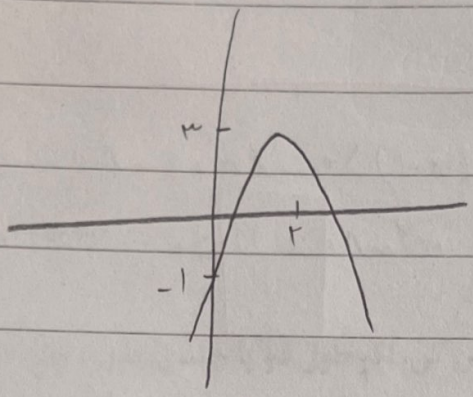
الف)



$-\frac{b}{2a} = \frac{4}{2} = 2$

$y = 4 + 7 - 8 = 3$

ب)



$-\frac{b}{2a} = \frac{-4}{-2} = 2$

$y = -4 + 8 - 1 = 3$

۲ـ

الف) $\Delta > 0 \quad (m+1)^2 - 4(2)(\frac{1}{4}m+2) = m^2 + 2m + 1 - 4m - 16 > 0$

$m^2 - 2m - 15 > 0 \rightarrow (m-5)(m+3) > 0$

	-3		5	
	+	−	+	

$m : (-\infty, -3) \cup (5, +\infty)$

ب) $\Delta = 0 \rightarrow m^2 - 2m - 15 = 0 \rightarrow (m-5)(m+3) = 0$

$\rightarrow m = 5 \text{ یا } -3$

ج) $\Delta < 0 \rightarrow (m-5)(m+3) < 0 \rightarrow$

	-3		5	
	+	−	+	

$m \rightarrow (-3, 5)$

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د) $\Delta \geq 0 \quad (m-5)(m+3) \geq 0$

	-3		5	
	$+$	$-$	$+$	

$m \Rightarrow (-\infty, -3] \cup [5, +\infty)$

ف)

(I) $\Delta > 0 \quad 4(m+1)^2 - 4 \cdot (m-2) > 0 \rightarrow 4m^2 + 4 + 8m - 4m + 8 > 0$

$4m^2 + 4m + 12 > 0 \div 4 \Rightarrow m^2 + m + 3 > 0 \rightarrow a > 0 \quad \Delta < 0 \rightarrow$ همه $\oplus$ ✓

(II) $P > 0 \rightarrow \frac{10}{m-2} > 0$

	2	
$-$	$\oplus$	$+$

$\Rightarrow (I \cap II \cap III) = \emptyset$

(III) $S < 0 \quad \frac{2m+2}{m-2} < 0$

	-1		2	
$+$		$-$	$\oplus$	$+$

ب) (I) $\Delta > 0 \rightarrow$ همه $\oplus$ ✓

$S < 0 \rightarrow (-1, 2)$

$P < 0 \quad \frac{10}{m-2} < 0$

	2	
	$-$	$\oplus$ $+$

$(-\infty, 2)$

$\Rightarrow (-1, 2)$

۴-

الف) $\Delta > 0 \rightarrow$ دو ریشه ✓

$P < 0 \rightarrow (-\infty, 2) \Rightarrow \boxed{m = (-\infty, 2)}$

$S \rightarrow x \quad ax$

ب) $\frac{+b}{2a} = +2 \rightarrow b = 2a \rightarrow -2m - 2 = 4m - 8$

$6m = 6 \rightarrow \boxed{m = 1}$

ج- $\frac{2}{3}x^2 - (2\sin\alpha)x + \frac{3}{2} = 0$

$\Delta \geq 0 \rightarrow 4\sin^2\alpha - 4(\frac{2}{3})(\frac{3}{2}) \geq 0 \rightarrow 4\sin^2\alpha - 4 \geq 0$

$4(\sin^2\alpha - 1) \geq 0$

$\sin^2\alpha \geq 1 \rightarrow \sin^2\alpha = 1 \rightarrow \sin\alpha = \pm 1$ (قَبول، غَیرقَبول)

قَبول قَبول

$\frac{2}{3}x^2 - 2x + \frac{3}{2} = 0 \xrightarrow{\times 6} 4x^2 - 12x + 9 = 0 \rightarrow (x - \frac{3}{2})(4x - 6) = 0 \rightarrow \boxed{x = \frac{3}{2}}$

$\frac{2}{3}x^2 + 2x + \frac{3}{2} = 0 \xrightarrow{\times 6} 4x^2 + 12x + 9 = 0 \rightarrow (x + \frac{3}{2})(4x + 6) = 0$

$\rightarrow \boxed{x = -\frac{3}{2}}$ غَیرقَبول

$\boxed{x = \frac{3}{2}}$

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$x^2 - 2x - 3 \to (x - \frac{3}{2})(2x+1) \longrightarrow (x-1)(2x+1)$

$x^2 - 4x - 10 \to (2x-5)(x+\frac{5}{2}) \to (2x-5)(x+1)$

$$\frac{-(x-1)(2x+1)(2x-5)(x+1)}{(x-1)(x+1)} = -4x^2 + 12x + 5 = y$$

$$-\frac{b}{2a} = \frac{-12}{-8} = \frac{12}{8}$$

Max $\hookrightarrow -4\left(\frac{144}{64}\right) + \frac{144}{16} + 5 = \boxed{\frac{289}{64}}$

۷-

$$3x^2 - (m+2)x - 2 = 0$$

$$4S = 3P + 7 \longrightarrow 4\left(\frac{m+2}{3}\right) = 3\left(\frac{-2}{3}\right) + 7$$

$$\frac{4m+8}{3} = \frac{-10+7m}{3} \longrightarrow 4m+8 = 7m-10 \longrightarrow 3m = 18 \to \boxed{m=6}$$

$$\alpha^2 + \beta^2 = S^2 - 2P = \frac{9}{4} + 1 = \boxed{\frac{13}{4}}$$

$S = \frac{3}{2}$

$P = -\frac{1}{2}$

۸- $\beta^2 = 5\beta - 2 \rightarrow \beta^3 = 5\beta^2 - 2\beta = 5(5\beta-2) - 2\beta = 23\beta - 10$

$\beta^4 = \beta(23\beta - 10) = 23\beta^2 - 10\beta = 23(5\beta-2) - 10\beta = 105\beta - 46$

$\beta^5 = \beta(105\beta - 46) = 105\beta^2 - 46\beta = 105(5\beta-2) - 46\beta = 479\beta - 210$

$5\beta^2 = 5(5\beta-2) = 25\beta - 10$

$4\alpha + \beta^5 = 4(5-\beta) + (479\beta - 210) = 20 - 4\beta + 479\beta - 210 \Rightarrow$

$\Rightarrow 475\beta - 190 \rightarrow \frac{475\beta - 190}{25\beta - 10} \xrightarrow{\div 5} \frac{95\beta - 38}{5\beta - 2} = \frac{19(5\beta-2)}{5\beta-2} = \boxed{19}$

۹- $ax^2 + bx + c = 2x + 10$ $\begin{cases} x = 2 \\ x = -3 \end{cases}$ $\Rightarrow \boxed{c = 6}$

$4a + 2b = 14 - 6 \rightarrow 10a = 10 \rightarrow \boxed{a = 1}$

$9a - 3b = 6 - 6 \rightarrow 9a = 3b \rightarrow b = 3a \rightarrow 3b = 9a \rightarrow \boxed{b = 3}$

$ax^2 + bx + c \Rightarrow x^2 - 3x + 6 \rightarrow x_0 = -\frac{b}{2a} = \boxed{\frac{3}{2}}$

۱۰- $y = x \quad y = 2x^2 + (m+1)x + m + 4$

$2x^2 + (m+1)x + m + 4 = x \rightarrow 2x^2 + mx + m + 4 = 0$

$\Delta = 0 \rightarrow m^2 - 8(m+4) = 0 \rightarrow m^2 - 8m - 32 = 0 \rightarrow (m-16)(m+2) = 0$

$m = \begin{cases} m = 16 \rightarrow 2x^2 + 17x + 36 = 0 \rightarrow (x+4)^2 = 0 \rightarrow \boxed{x = -4} \text{ ق ق ع} \\ m = -2 \rightarrow 2x^2 - 2x + 2 = 0 \rightarrow (x-1)^2 = 0 \rightarrow \boxed{x = 1} \text{ ق ق} \end{cases}$

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