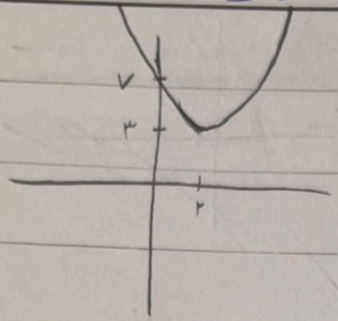
۲۰

۱-

الف)

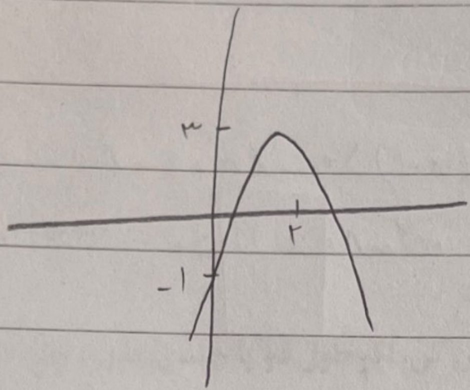


$-\frac{b}{2a} = \frac{4}{2} = 2$

$y = 4 + 7 - 8 = 3$

(۵)

ب)



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

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

۲-

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

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

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

(۵)

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

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

$\rightarrow m = 5$ 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
$+$	0 $-$ 0	$+$

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

ف)

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

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

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

2	
$-$	$+$

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

$(III) \quad S < 0 \quad \frac{3m+2}{m-2} < 0$

$-\frac{2}{3}$		2
$+$	0 $-$ $\|$	$+$

5

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

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

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

2	$(-\infty, 2)$
$-$	$+$

$\Rightarrow (-1, 2)$

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الف)

$\Delta > 0 \rightarrow$ (+) همواره ✓

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

$S \rightarrow x$ ax

د

ب)

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

$6m = 6 \rightarrow m = 1$

۵ـ

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

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

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

$\sin^2\alpha \leq 1$ (غلط) $\rightarrow \sin^2\alpha = 1 \rightarrow \sin\alpha = \pm 1$ (درست / غلط)

درست

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

د

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

$\rightarrow x = -\frac{3}{2}$ → غلط

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

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

$x^2 - 3x - 10 \to (2x-5)(x+\frac{5}{4}) \to (2x-5)(x+1)$

$$\frac{-(x-1)(3x+1)(2x-5)(x+1)}{(x-1)(x+1)} = -6x^2 + 13x + 5 = y$$

Max: $-\frac{b}{2a} = \frac{-13}{-12} = \frac{13}{12}$

$-6\left(\frac{169}{144}\right) + \frac{169}{12} + 5 = \boxed{\frac{289}{24}}$

(5)

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7 — $mx^2 - (m+2)x - 2 = 0$

(5)

$3S = 5P + 7 \to 3\left(\frac{m+2}{m}\right) = 5\left(\frac{-2}{m}\right) + 7$

$\frac{3m+6}{m} = \frac{-10+7m}{m} \to 3m+6 = 7m-10 \to 4m = 16 \to \boxed{m=4}$

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

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

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

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

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

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

$m = \begin{cases} m = 16 \rightarrow 2x^2 + 12x + 8 = 0 \rightarrow (x+2)^2 = 0 \rightarrow \boxed{x = -2} \text{ ق ق ع} \\ m = -2 \rightarrow 2x^2 - 2x + 2 = 0 \rightarrow (x-1)^2 = 0 \rightarrow \boxed{x = 1} \text{ ق ق} \end{cases}$ ✓