Subject: کیمیا سبزعلی

Date:

~~مشتق ... صفر باید ... جمله ... جمع ... ضرب~~

① $x^2 - ax + b$ $\quad 1^2 - a + b = 0 \to 1 = a - b \to 3 = 3a - 3b$

$9 - 3a + b \to 9 = 3a - b \xrightarrow{\times(-3)} 9 = 3a - b$

$6 = 2b \to b = 3$

$1 = a - 3 \to a = 4$

	1		3	
+		−		+

$\boxed{a + b = 7}$

② $y = ((k-2)x + m - 1)(x - 3n)^2 \quad -1 - 3n = 0$

$-1 = 3n \to n = -\frac{1}{3} \quad ((k-2)4 + m - 1) \quad 4k - 8 + m - 1 = m \to 9 - 4k$

	* −1		4	
+		+		−

$\frac{m}{n} + k \to \frac{9 - 4k}{-\frac{1}{3}} + k \to$

$k = 1$

$-27 + 12k + k = 13k - 27 \to 13 - 27 = -14$

$((k-2)x + (9 - 4k) - 1)(x+1)^2$

$((k-2)x + 8 - 4k)(x+1)^2$

$(xk - 2x + 8 - 4k)(m+1)^2$

$k(x - 4) - 2(x - 4)$

$(x - 4)(x - 2)$

$\to (k-2)(x-4)(x+1)^2$

$(x-4) > 0 \quad x + 1 > 0$

$x > 4$

منفی است

$k - 2 < 0 \to k < 2$

منفی است

$k = 1$

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③

$y = -\frac{1}{2}x^2 + 2x + 6 > \frac{7}{2}$

$-\frac{1}{2}x^2 + 2x + 6 > \frac{7}{2} \xrightarrow[\times 2]{} -x^2 + 4x + 12 > 7 \Rightarrow -x^2 + 4x + 5 > 0$

$x_1 = -1$ $x_2 = 5$

$\begin{array}{c|c|c} & -1 & 5 \\ - & + & - \end{array} \rightarrow (-1, 5)$

$b - a = 5 - (-1) = \boxed{6}$

④

$f(x) = x^3 - 3x^2 - x + 3$ $(x-1)(x+1)(x-3)$

$x > 0$

$\begin{array}{c|c|c|c} & -1 & 1 & 3 \\ - & + & - & + \end{array}$

$(-\infty, -1) \cup (1, 3) \rightarrow (1, 3) \rightarrow \frac{1+3}{2} = 2$

$f(2) = 2^3 - 3(2)^2 - 2 + 3 \rightarrow 8 - 12 - 2 = -6 + 3 = -3$

⑤

$(a-1)x^2 + (a-1)x + 1$ $\Delta < 0$ $b^2 - 4ac < 0$

$(a-1)^2 - 4(a-1)(1) \rightarrow a^2 + 1 - 2a - 4a + 4 < 0 \rightarrow a^2 - 6a + 5 < 0$

1 5

$a < 0 \rightarrow a - 1 < 0 \rightarrow a < 1$

$\begin{array}{c|c|c} & 1 & 5 \\ + & - & + \end{array}$

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مطابق

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	0		2	
	$-$	$-$	$+$	

$\to (2, +\infty)$

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

-2		1		2		3	
$+$	$-$	$-$	$+$	$-$			

$[-2, 2) \cup [3, +\infty)$

8

$$\frac{3x^2-2x}{x^2+4} = 2 \Rightarrow 3x^2-2x = 2x^2+8 \Rightarrow x^2-2x-8=0$$

$$\Delta = 4-4(1)(-8) = 36 \qquad \frac{-b\pm\sqrt{\Delta}}{2a} \begin{cases} \to 4 \\ \to -2 \end{cases}$$

-2		4	
$+$	$-$	$+$	

$(-2, 4) \to (a, b) \to b-a \to 4-(-2) = 6$

پس تراز $y=2$

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$$-1 < \frac{3x^2-4x}{x+1} < 1 \to 0 < \frac{3x^2-4x}{x+1} + 1 \to 0 < \frac{3x^2-4x+x+1}{x+1}$$

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

$$0 < \frac{3x^2-3x+1}{x+1} \qquad 9-4(3)(1) = -3 \to \text{همواره } +$$

	-1	
$-$		$+$

$(-1, +\infty)$

$$\frac{3x^2-4x}{x+1} < 0 \to \Delta = b^2-4ac \to 16-4(3)(0) = 16$$

$$\frac{-b\pm\sqrt{\Delta}}{2a} \begin{cases} \to \frac{4}{3} \\ \to 0 \end{cases}$$

-1		0		$\frac{4}{3}$	
$-$	$+$	$-$	$+$		

$(-\infty, -1) \cup (0, \frac{4}{3})$

$-1 \quad 0 \quad \frac{4}{3}$

$(0, \frac{4}{3})$

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$$\frac{x^2-10}{x} \geq 3 \rightarrow \frac{x^2-10}{x} - 3 \geq 0 \rightarrow \frac{x^2-10-3x}{x} \geq 0$$

$$\frac{(x+2)(x-5)}{x} \geq 0$$

	-2		0		5	
$-$		$+$		$-$		$+$

$(-\infty , -2] \cup (0 , 5]$