آرین شفامراد

۱)

$$\begin{array}{ccccc} & 1 & & 3 & \\ + & 0 & - & 0 & + \end{array}$$

$$\Rightarrow x^2 \underset{a}{-4}x \underset{b}{+3} \Rightarrow \boxed{3+4=7}$$

$a=-4 \qquad b=3$

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۲)

$m-3n \to -1-3n=0$

$\Rightarrow 3n=-1 \Rightarrow n=\frac{-1}{3}$

$4(k-2)+m-1=4k-8+m-1=4k+m-9=0$

$\left.\begin{array}{l} k-2<0 \\ k\in\mathbb{N} \end{array}\right\} \Rightarrow k=1 \qquad 4+m-9=0 \Rightarrow m=5$

$\frac{m}{n}+k=\frac{5}{\frac{-1}{3}}+1=-15+1=\boxed{-14}$

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۳)

$-\frac{1}{2}x^2+2x+6>\frac{7}{2} \Rightarrow -\frac{1}{2}x^2+2x+\frac{5}{2}>0$

$-x^2+4x+5>0 \Rightarrow x^2-4x-5<0$

$$\begin{array}{ccccc} & -1 & & 5 & \\ + & 0 & - & 0 & + \end{array}$$

$(-1,5) \Rightarrow 5-(-1)=\boxed{6}$

۴)

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

$-1 \quad 1 \quad 3$: $- \; + \; - \; +$ ⟹ $(a,b) = (1,3)$ ⟷ ۲

$x>0$

$8-3(4)-2+3 = -3$ (با $8-3(4) = -4$)

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۵)

$\Delta<0 \Rightarrow (a-1)^2-4(a-1) = (a-1)(a-1-4)$

$= (a-1)(a-5)<0$ $1 \quad 5$: $+ \; - \; +$ ⟹ $a \to (1,5)$

$\underbrace{(a-1)}_{A} \Rightarrow A \to (0,4)$

$Ax^2+Ax+1<0$

$Ax^2+Ax<-1$

$\left.\begin{array}{l} A>0 \\ A<4 \end{array}\right\} \Rightarrow Ax^2+Ax$ مینیمم | $\frac{-A}{2A} = \frac{-1}{2}$

$\frac{1}{4}A - \frac{1}{2}A = -\frac{1}{4}A$ ← درست

$\Rightarrow a \in \emptyset$

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۶)

$\frac{m^4+m^2}{m-2} = \frac{m^2(m^2+1)}{m-2}$

$0^* \quad 2$: $- \; - \; +$ ⟹ $m \in (2,+\infty)$

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۷)

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

$-2 \quad 1^* \quad 2 \quad 3$: $+ \; - \; - \; + \; -$

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

(۸

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

$$\Rightarrow x^2-2x-8<0 \Rightarrow (x-4)(x+2)<0 \qquad \begin{array}{ccccc} & -2 & & 4 & \\ + & \phi & - & \phi & + \end{array}$$

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

(۹

$$-1 < \frac{x(2x-4)}{x+1} < 0$$

$$\frac{x(2x-4)}{x+1} < 0 \qquad \begin{array}{ccccc} & -1 & 0 & \frac{4}{2} & \\ - & \phi & + & \phi & - \end{array} \longrightarrow (-\infty,-1) \cup (0,\tfrac{4}{2})$$

همواره مثبت

$$\frac{x(2x-4)}{x+1} > -1 \Rightarrow \frac{2x^2-4x+x+1}{x+1} > 0 \Rightarrow \frac{2x^2-3x+1}{x+1} > 0$$

$$\begin{array}{ccc} & 1 & \\ - & \phi & + \end{array} \longrightarrow x \longrightarrow (0,+\infty)$$

$$\left((-\infty,-1) \cup (0,\tfrac{4}{2})\right) \cap (0,+\infty) \longrightarrow (0,\tfrac{4}{2})$$

(۱۰

$$\frac{x^2-10}{x} - 3 \leq 0 \Rightarrow \frac{x^2-3x-10}{x} \leq 0$$

$$\Rightarrow \frac{(x-5)(x+2)}{x} \leq 0 \qquad \begin{array}{ccccc} & -2 & 0 & 5 & \\ - & \phi & + & \phi & - \end{array} \Rightarrow (-\infty,2] \cup (0,5]$$