

$x^2 - dx + b < 0 \rightarrow$ if $1 < x < 3$

x	1	3	B
y	+	-	+

$a+b=1 \Rightarrow$ ریشه ها = ۱ و ۳
 رابطه $(x-1)(x-3) = x^2 - 4x + 3$
 $\Rightarrow a=4 > b=3 \Rightarrow a+b = 4+3 = 7$

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$y = -\frac{1}{4}x^2 + 2x + \frac{5}{4} > 0 \rightarrow (a < b)$
 $y = -\frac{1}{4}x^2 + 2x + 9 > \frac{1}{4} \rightarrow (a < b)$
 $\max(b-a) = 1$
 $\frac{1}{4}x^2 - 2x - \frac{5}{4} < 0$
 $x^2 - 8x - 5 < 0$
 $(x-5)(x+1) < 0$

x	-1	5	B
y	+	-	+

 $\max(b-a) = 5 - (-1) = 6$

جواب سوال ۳

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جواب سوال ۲

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

x	-1	3	B
y	+	-	+

رشته های خط راست
 ریشه ها = -1 و 3
 $x-3n=0 \Rightarrow x=-1 \Rightarrow -1-3n=0 \Rightarrow 3n=-1 \Rightarrow n=-\frac{1}{3}$
 $k-2 < 0 \Rightarrow k < 2 \Rightarrow k \in \mathbb{N} \Rightarrow k=1$
 $-x+m-1=0 \Rightarrow x=1 \Rightarrow 1+m-1=0 \Rightarrow m=0$
 $\frac{m}{n} + k = \frac{0}{-\frac{1}{3}} + 1 = 0 - 1 + 1 = 0$

x	1	3	B
y	+	-	+

ریشه ها = 1 و 3

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$f(x) = x^3 - 3x^2 - x + 3 = (x-2)(x^2 - x - 3)$
 $x^2 - 3x^2 - x + 3 < 0$
 $(x-2)(x^2-1) < 0$

x	1	2	B
y	-	+	-

شروط سوال (۱ و ۳)
 $f(2) = 2^3 - 3(2)^2 - 2 + 3 = 8 - 12 - 2 + 3 = -3$
 $= -3$

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$(a-1)x^2 + (a-1)x + 1 < 0$

x	1	1	B
y	+	+	+

$\Delta = 0 \Rightarrow a-1 < 0 \Rightarrow a < 1$
 $\Delta < 0 \Rightarrow a-1 < 0 \Rightarrow a < 1$
 $a-1 < 0 \Rightarrow a < 1$
 $(a-1)^2 - 4(a-1) < 0$
 $a^2 - 2a + 1 - 4a + 4 < 0$
 $a^2 - 6a + 5 < 0$
 $(a-5)(a-1) < 0$

x	1	5	B
y	+	-	+

$\rightarrow [1, 5]$

$a \in \emptyset \rightarrow (1 \text{ و } 5) \cap [1, 5] = \emptyset$

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$$\frac{x^2 - 1}{x^2 + 1} < 0 \quad \frac{x^2 - 1}{x^2 + 1} < 0 \rightarrow (x > +\infty)$$

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$$\frac{(x^2 - 1)(x^2 + 1)}{(x^2 - x - 1)(x^2 - 1)} \leq 0 \quad \frac{x^2 - 1}{x^2 + 1} \leq 0 \rightarrow [x > 2] \cup [x > +\infty)$$

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$$f(x) = \frac{x^2 - 2x}{x^2 + 1} < 2 \quad \frac{x^2 - 2x}{x^2 + 1} - 2 < 0 \rightarrow \frac{x^2 - 2x - 2x^2 - 2}{x^2 + 1} = \frac{-x^2 - 2x - 2}{x^2 + 1} < 0$$

$$-x^2 - 2x - 2 < 0 \quad \frac{x^2 + 2x + 2}{x^2 + 1} < 0 \quad \text{Max}(b-a) = 2 - (-1) = 3$$

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$$-1 < \frac{x^2 - 2x}{x + 1} < 0 \quad \textcircled{1} \rightarrow -1 < \frac{x^2 - 2x}{x + 1} < 0 \quad \frac{x^2 - 2x}{x + 1} + 1 < 0 \quad \frac{x^2 - 2x + x + 1}{x + 1} = \frac{x^2 - x + 1}{x + 1} < 0$$

$$\frac{x^2 - x + 1}{x + 1} < 0 \quad \textcircled{2} \rightarrow \frac{x^2 - x + 1}{x + 1} < 0 \quad \frac{x^2 - x + 1}{x + 1} < 0 \quad \frac{x^2 - x + 1}{x + 1} < 0$$

$$\textcircled{1} \cap \textcircled{2} = (-\infty, -1) \cup (0, \frac{1}{2}) \cap (-1, +\infty) = (0, \frac{1}{2})$$

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$$\frac{x^2 - 10}{x} < 2 \quad \frac{x^2 - 10}{x} - 2 < 0$$

$$\frac{x^2 - 10 - 2x}{x} < 0 \quad \frac{x^2 - 2x - 10}{x} < 0 \rightarrow (x - 2)(x + 2)$$

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

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