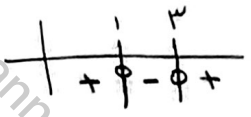
(۱)

$x^2 - ax + b$



$f(2) = 4 - 2a + b < 0$

$f(1) = 1 - a + b = 0 \rightarrow b - a = -1$

$f(3) = 9 - 3a + b = 0 \rightarrow b - 3a = -9$

$a = 4 \Rightarrow a + b = 7$

$b = 3$

(۲)

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

$x - 3n = 0 \rightarrow -1 - 3n = 0$ ($x = -1$)

$3n = -1$

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

x	-1	$\frac{1}{3}$
P	+ ۰ + ۰ −

منفی باشد ← یکی از ضریب‌های x باید

$x = \frac{1}{3} \rightarrow \frac{m}{n} + k$

$\frac{1}{3}k + m - 1 = 0$

$k - 2 < 0 \rightarrow k < 2$

$k \in N \rightarrow k = 1$

$\frac{1}{3}k + m = 9 \xrightarrow{k=1} m = 8$

$\frac{8}{\frac{1}{3}} + 1 = 8 \times 3 + 1 = 25$

(۳)

$y = -\frac{1}{2}x^2 + 2x + 9$

$-\frac{1}{2}x^2 + 2x + 9 > \frac{7}{2} \rightarrow -\frac{1}{2}x^2 + 2x + 9 - \frac{7}{2} > 0$

$\times 2 \rightarrow -x^2 + 4x + 18 - 7 > 0$

$\times -1 \rightarrow x^2 - 4x - 11 < 0$

$(x - 5)(x + 1) < 0 \rightarrow$

x	-1	5
	+ ۰ − ۰ +

$x = 5 \quad x = -1$

$b = 5 \quad a = -1$

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

(۴)

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

$x^3 - x^2$

$-2x^2 - x + 3$

$-2x^2 + 2x$

$-3x + 3$

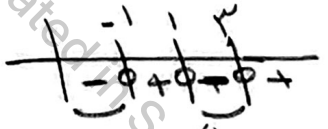
$-3x + 3$

0

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

$\Rightarrow (x - 1)(x + 1)(x - 3)$

$x = 1 \quad x = -1 \quad x = 3$



بازه‌ی منفی = محور xها پایین

بزرگترین بازه

$f(2) = 8 - 12 - 2 + 3 = -3$

(۳)

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

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

$\Delta = b^2-4ac = (a-1)^2 - 4(a-1) = a^2-6a+5$

a^2+1-2a $\quad -4a+4$

$\Delta<0$

$(a-5)(a-1)<0$

$a=5$ $\quad a=1$

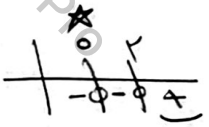
$1<a<5$

$\rightarrow \boxed{\emptyset}$

(۴)

$\frac{m(m^3+m)}{m-2} = \frac{m(m(m^2+1))}{m-2} = \frac{m^2(m^2+1)}{m-2} \rightarrow$

$m=0$ ناقدر ریشه حقیقی



$m=2$

$\boxed{m \in (2,+\infty)}$

(۷)

$\frac{(x^2-x-6)(x-1)^2}{(x^2+x+1)(2-x)^3} \geq 0 \rightarrow$

$x=3$ $\quad x=-2$ $\quad x=1$ $\quad x=2$

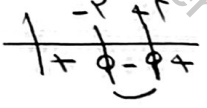
$x \in [-2,2) \cup [3,+\infty)$

(۸)

$f(x) = \frac{3x^2-2x}{x^2+4} < 2 \rightarrow \frac{3x^2-2x-2x^2-8}{x^2+4} < 0$

$\frac{x^2-2x-8}{x^2+4} < 0 \rightarrow \frac{(x-4)(x+2)}{(x^2+4)} < 0 \rightarrow$

$x=4$ $\quad x=-2$



$b-a = 4-(-2) = 6$

$\Rightarrow \boxed{(0, \frac{3}{2})}$

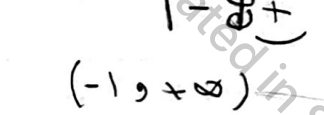
(۶)

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

$\begin{cases} -1 < \frac{3x^2-4x}{x+1} \rightarrow 0 < \frac{3x^2-4x+x+1}{x+1} \rightarrow \frac{(3x-1)(x-1)}{x+1} > 0 \rightarrow \\ \frac{3x^2-4x}{x+1} < 0 \rightarrow \frac{x(3x-4)}{x+1} < 0 \rightarrow \end{cases}$

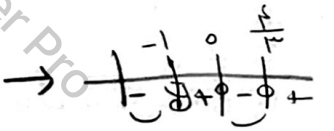
فاقد ریشه حقیقی

$x=-1$



$(-\infty,-1) \cup (1,+\infty)$

$x=0$ $\quad x=\frac{4}{3}$



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

(1.)

$$\frac{x^2-10}{x} \leq 3 \rightarrow \frac{x^2-10-3x}{x} \leq 0 \longrightarrow \frac{(x-5)(x+2)}{x} \leq 0$$

$x=5$ ↙ , $x=0$, $x=-2$

	-2		0		5	
	$-$	$+$	$\not\exists$	$-$	0	$+$

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