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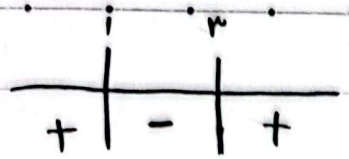
۱- $x^2 - ax + b$

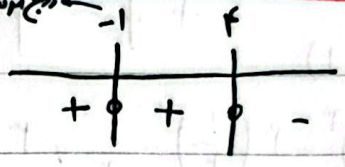


$\Delta > 0 \rightarrow b^2 - 4ac = a^2 - 4b > 0 \quad \frac{+a \pm \sqrt{a^2 - 4b}}{2} = 1, 3$

$$\begin{cases} +a + \sqrt{a^2-4b} = 4 \\ +a - \sqrt{a^2-4b} = 2 \end{cases} \Rightarrow 2a = 6 \Rightarrow \boxed{a = 3} \Rightarrow \begin{matrix} 3 + \sqrt{9-4b} = 4 \\ \sqrt{9-4b} = 1 \end{matrix} \Rightarrow 9 - 4b = 1$$

$8 = 4b \Rightarrow \boxed{b = 2}$ $\quad 3 + 2 = 5$

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



$(x - 3n)^2 = 0 \Rightarrow x = 3n \Rightarrow 3n = -1 \Rightarrow n = -\frac{1}{3}$

$(k-2)x + m - 1 = 0 \Rightarrow x = \frac{1-m}{k-2} \Rightarrow (k-2)(3) + m - 1 = 0 \Rightarrow 3k - 6 + m - 1 = 0 \Rightarrow m = 7 - 3k$

$y = (k-2)x \cdot x^2 \Rightarrow k - 2 < 0 \Rightarrow k < 2 \rightarrow$ k چون بعد طبیعی $1 =$

$m = 7 - 3(1) = 4 \quad n = -\frac{1}{3} \quad \frac{m}{n} + k = \boxed{-12}$

۳- $y = -\frac{1}{2}x^2 + 2x + 4 \quad (a,b) > \frac{5}{2} \quad b - a$

$x = \frac{-b}{2a} = -\frac{2}{2(-\frac{1}{2})} = 2 \quad a = -\frac{1}{2}, b = 2$

$y = -\frac{1}{2}(4) + 3 + 4 = 7 \quad -\frac{1}{2}x^2 + 2x + 4 > \frac{5}{2} \Rightarrow -x^2 + 3x + 11 > 5$

$\Rightarrow -x^2 + 3x + 6 > 0 \Rightarrow x^2 - 3x - 6 < 0 \Rightarrow x_{1,2} = -1, 6$

$x \in (-1; 6) \quad (a,b) = (-1, 6) \quad 6 + 1 = \boxed{7}$

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$f(x) = x^3 - 3x^2 - x + 3$ $\quad f'(x) = 3x^2 - 6x - 1$ $\quad -۴$

$3x^2 - 6x - 1 = 0 \Rightarrow \frac{6 \pm 4\sqrt{3}}{6} = 1 \pm \frac{2\sqrt{3}}{3}$ $\quad x_1 = 1 - \frac{2\sqrt{3}}{3}$ $\quad x_2 = 1 + \frac{2\sqrt{3}}{3}$

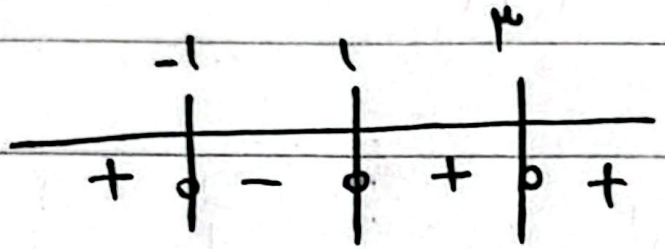
x_1 ↓ Max $\quad$ x_2 ↓ Min

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

$x = 1 \longrightarrow$ بشه $\quad x^3 - 3x^2 - x + 3 = (x-1)(x^2 - 2x - 3)$

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

$x = -1, 1, 3$



$(a, b) = (0, 1)$ $\quad x = \frac{1}{2}$

$f(\frac{1}{2}) = (\frac{1}{2})^3 - 3(\frac{1}{2})^2 - \frac{1}{2} + 3 = \frac{15}{8}$

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۵- $(a-1)x^2+(a-1)x+1$ $\quad f(x)=(a-1)(x^2+x)+1$

$f(x)>0 \Rightarrow (a-1)(x^2-x)+1>0$ $\quad x^2+x=x(x+1)$ $\quad x<0$

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

$a-1=0 \Rightarrow a=1$ $\quad f_{min}=(a-1)(-\frac{1}{\epsilon})+1>0 \Rightarrow a-1<\epsilon \Rightarrow a<2$

$a\in[1,2)$

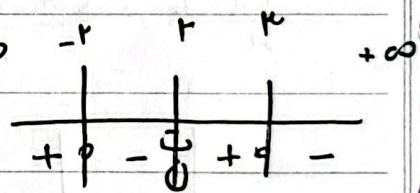
۶- $m\left(\frac{m^2+m}{m-2}\right)$ $\quad E=m.\frac{m(m^2+1)}{m-2}=\frac{m^2(m^2+1)}{m-2}$ $\quad m^2>0$

$E>0 \Rightarrow m-2>0$ $\boxed{m>2}$

۷- $\frac{(x^2-x-6)(x-1)^2}{(x^2+x+1)(2-x)^4}\leq 0 \Rightarrow x^2-x-6=(x-3)(x+2)$

$x^2+x+1>0$ $\quad (2-x)^4=(x-2)^4$

$\frac{(x-3)(x+2)(x-1)^2}{(x^2+x+1)(2-x)^4}=-\frac{(x-3)(x+2)(x-1)^2}{(x^2+x+1)(x-2)^4}$



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

$f(x)=\frac{2x^2-2x}{x^2+6}<2 \Rightarrow 2x^2-2x<2x^2+8 \Rightarrow 2x^3-2x^2-2x-8<0$

$g(x)=2x^3-2x^2-2x-8$ $\quad x=2 \Rightarrow 4$ $\quad x=1 \Rightarrow -9$ بین ۱ و ۲ صفر داریم

$(a,b)=(-\infty,1,18)=b-a=+1,18+\infty=\infty$

NEGAR COVER

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۹- $-1 < \frac{3x^2-4x}{x+1} < 0$ $\frac{3x^2-4x}{x+1} < 0$ $\Rightarrow 3x^2-4x = x(3x-4)$

$\frac{x(3x-4)}{x+1} < 0$ $x = 0, \frac{4}{3}, -1$

-1	0	$\frac{4}{3}$
+	−	−	+

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

$\frac{3x^2-4x+x+1}{x+1} > 0 \Rightarrow \frac{3x^2-3x+1}{x+1} > 0$ $\Delta = 9 - 12 = -3$

$x \in (-1,0) \cup (0, \frac{4}{3})$, $x > -1$ $\Rightarrow (-1,0) \cup (0, \frac{4}{3})$

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

$\frac{x^2-3x-10}{x} = \frac{(x-5)(x+2)}{x} \leqslant 0$ $x = -2, 0, 5$

-2	0	5
−	+	−	+

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

حسنا سعیداف