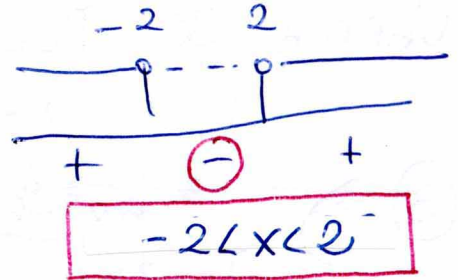


Ex 4 | A) $x^4 - 16 < 0$

$(x^2 - 4)(x^2 + 4) < 0$

$x^2 - 4 > 0 \quad x < -2 \cup x > 2$

$x^2 + 4 > 0 \quad \forall x \in \mathbb{R}$



B) $x^6 - 4x^4 \geq 0$

$x^4(x^2 - 4) \geq 0$

$x^4 \geq 0 \quad \forall x \in \mathbb{R}$

$x^2 - 4 \geq 0 \quad x \leq -2 \cup x \geq 2$

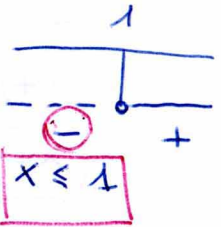
C) $4x^3 - 4x^2 + 5x - 5 \leq 0$

$4x^2(x-1) + 5(x-1) \leq 0$

$(x-1)(4x^2 + 5) \leq 0$

$4x^2 + 5 \geq 0 \quad \forall x \in \mathbb{R}$

$x - 1 \geq 0 \quad x \geq 1$



ES 3 a) $(x+1) \left(\frac{5x-3}{12} - \frac{x+2}{6} - \frac{x-1}{4} \right) \geq - \left(\frac{x+4}{3} \right)^2$

$(x+1) \left(\frac{5x-3-2(x+2)-3(x-1)}{12} \right) \geq - \frac{(x^2+16+8x)}{3}$

$(x+1) \left(\frac{5x-3-2x-4-3x+3}{12} \right) \geq \frac{-4(x^2+16+8x)}{12}$

$(x+1) \cdot (-4) \geq -4(x^2+16+8x)$

$-4x-4 \geq -4x^2-64-32x$

$4x^2+32x-4x-4+64 \geq 0$

$4x^2+28x+60 \geq 0$

$x^2+7x+15 \geq 0 \quad x$

$x_{1,2} = \frac{-7 \pm \sqrt{49-60}}{2} \quad \Delta < 0 \Rightarrow x \in \mathbb{R}$

b) $\left(\frac{4}{3} - x\right)^2 > \frac{1}{3} - (x-1)\left(x-\frac{1}{3}\right)$

$\frac{16}{9} + x^2 - \frac{8}{3}x > \frac{1}{3} - x^2 + \frac{1}{3}x + x - \frac{1}{3}$

$\frac{16+9x^2-24x}{9} > \frac{-9x^2+3x+9x}{9}$

$18x^2 - 36x + 16 > 0$

$9x^2 - 18x + 8 > 0$

$x_{1,2} = \frac{9 \pm \sqrt{81-72}}{9} = \frac{9 \pm 3}{9} \Rightarrow \begin{cases} x_1 = \frac{12}{9} \\ x_2 = \frac{6}{9} \end{cases}$

VAL EST

$x < \frac{2}{3} \cup x > \frac{4}{3}$

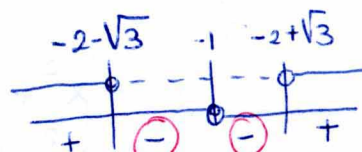
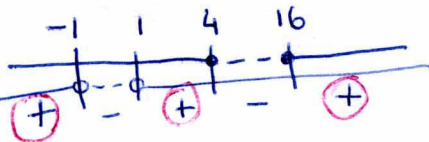
c) $\frac{x^2-20x+64}{x^2-1} \geq 0$

$x^2-20x+64 \geq 0 \quad x_{1,2} = \frac{20 \pm \sqrt{400-64}}{2} = 10 \pm 6 = \begin{cases} 4 \\ 16 \end{cases}$

NUM > 0 $x \leq 4 \cup x \geq 16$

DEN > 0 $x < -1 \cup x > 1$

$x < -1 \cup -1 < x \leq 4 \cup x \geq 16$



$-2\sqrt{3} < x < -1 \cup -1 < x < -2\sqrt{3}$

d) $\frac{2x}{2(x+1)} + \frac{3x-2}{(x+1)^2} + \frac{2-x}{(x+1)^2} + \frac{1}{x+1} < 0$

$\frac{2x^2+2x+6x-4+4-2x+2x+2}{2(x+1)^2} < 0$

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

$\frac{2x^2+8x+2}{2(x+1)^2} < 0$

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

NUM > 0 $x^2+4x+1 > 0$

$x_{1,2} = \frac{-4 \pm \sqrt{16-4}}{2} = -2 \pm \sqrt{3}$

VAL EST $x < -2-\sqrt{3} \cup x > -2+\sqrt{3}$

$\sim -3.7 \quad (-0.26)$

DEN > 0 $\forall x \in \mathbb{R} \quad x \neq -1 \text{ c.t.}$

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