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$$\begin{cases} (7^x-1)^2 - 5(7^x-1) + 4 < 0 \\ \left(\frac{1}{2}\right)^{\sqrt{x^2-3}} \cdot \sqrt[x]{4} - 1 \geq 0 \end{cases} \qquad \begin{cases} \log_7 2 < x < \log_7 5 \\ \sqrt{3} \leq x \leq 2 \end{cases}$$

(I) $7^x - 1 \rightsquigarrow t^2 - 5t + 4 < 0 \rightsquigarrow (t-4)(t-1) < 0$

$t = 1, 4 \qquad 1 < t < 4$

$1 < 7^x - 1 < 4 \rightsquigarrow \begin{array}{l} 1 < 7^x - 1 \rightsquigarrow 2 < 7^x \rightsquigarrow x > \log_7 2 \\ 7^x - 1 < 4 \rightsquigarrow 7^x < 5 \rightsquigarrow x < \log_7 5 \end{array}$

$$\log_7 2 < x < \log_7 5$$

(II) $\left(\frac{1}{2}\right)^{\sqrt{x^2-3}} \cdot \sqrt[x]{4} - 1 \geq 0$

$2^{-\sqrt{x^2-3}} \cdot 2^{\frac{2}{x}} \geq 2^0$

$2^{-\sqrt{x^2-3} + \frac{2}{x}} \geq 2^0$

$-\sqrt{x^2-3} + \frac{2}{x} \geq 0$

$\sqrt{x^2-3} \leq \frac{2}{x}$

a) $\begin{cases} x^2 - 3 \geq 0 \\ \frac{2}{x} \geq 0 \\ x^2 - 3 \leq \frac{4}{x^2} \end{cases}$

a) $x^2 - 3 \geq 0 \qquad x^2 \geq 3 \qquad x = \pm\sqrt{3} \qquad \boxed{x \leq -\sqrt{3} \ \vee \ x \geq \sqrt{3}}$

b) $\frac{2}{x} \geq 0 \rightsquigarrow \boxed{x > 0}$

c) $x^2 - 3 \leq \frac{4}{x^2} \rightsquigarrow \frac{x^4 - 3x^2 - 4}{x^2} \leq 0$

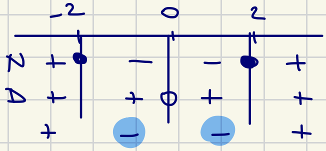
$N \geq 0 \qquad x^4 - 3x^2 - 4 \geq 0 \qquad x^2 = t \rightsquigarrow t^2 - 3t - 4 \geq 0 \qquad (t-4)(t+1) \geq 0$

$t = 4,\ t = -1 \qquad t \leq -1 \ \vee \ t \geq 4$

$x^2 \leq -1 \ \vee \ x^2 \geq 4 \rightsquigarrow \boxed{x \leq -2 \ \vee \ x \geq 2}$

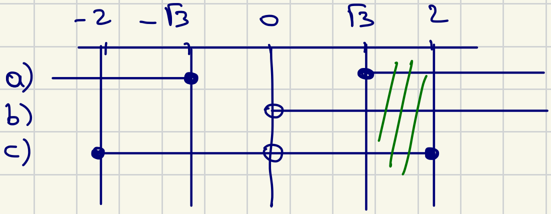
Mai $\qquad x = \pm 2$

$D > 0 \quad x^2 > 0$ Sempre con $x \neq 0$



$$\boxed{-2 \le x \le 2 \quad \text{con} \quad x \neq 0}$$

Faccio il sistema



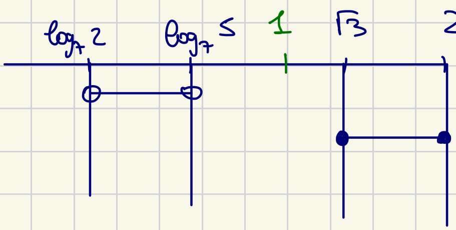
<u>Sol</u>: $\sqrt{3} \le x \le 2$

$$\begin{cases} \log_7 2 < x < \log_7 5 \\ \sqrt{3} \le x \le 2 \end{cases}$$

<u>Oss Carlos</u>

$\log_7 2 = x \longleftrightarrow 7^x = 2$

$\log_7 5 = x \longleftrightarrow 7^x = 5$



$\rightsquigarrow$ Impossibile

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$$\frac{-2\sin^2(\pi-\alpha) + \cos^2(\pi-\alpha) + 2}{tg(\pi-\alpha)\sin(\pi/2-\alpha)+1}$$

$$\frac{-2\sin^2\alpha + (-\cos\alpha)^2 + 2}{-tg(\alpha)\cos\alpha + 1} = \frac{-2\sin^2\alpha + \overbrace{\cos^2\alpha}^{1-\sin^2\alpha} + 2}{-\frac{\sin\alpha}{\cancel{\cos\alpha}} \cdot \cancel{\cos\alpha} + 1} =$$

$$\frac{-2\sin^2\alpha + 1 - \sin^2\alpha + 2}{1-\sin\alpha} = \frac{3-3\sin^2\alpha}{1-\sin\alpha} = \frac{3\overbrace{(1-\sin^2\alpha)}^{\cancel{(1-\sin\alpha)}(1+\sin\alpha)}}{\cancel{1-\sin\alpha}} = 3(1+\sin\alpha)$$

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$$\frac{1-2\cos^2 x}{|\cos x|} > tg\,x$$

Caso a: $\cos x > 0$ $\qquad -\frac{\pi}{2} < x < \frac{\pi}{2}$

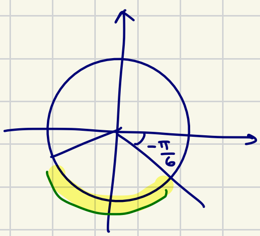
$$\frac{1-2\cos^2 x}{\cos x} - \frac{\sin x}{\cos x} > 0$$

$$\frac{1-2\cos^2 x - \sin x}{\cos x} > 0 \leadsto \frac{1-2+2\sin^2 x - \sin x}{\cos x} > 0$$

$$\frac{2\sin^2 x - \sin x - 1}{\cos x} > 0$$

$N>0$, $\sin x = t$ $\qquad 2t^2 - t - 1 > 0$ $\qquad t = -\frac{1}{2}, 1$

$t < -\frac{1}{2} \quad \vee \quad t > 1$

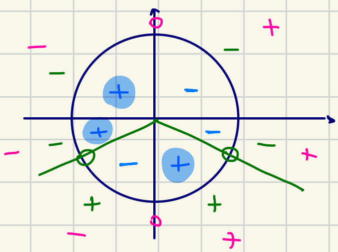


$\sin x < -\frac{1}{2} \quad \vee \quad \cancel{\sin x > 1} \leadsto$ Mai

$\frac{7}{6}\pi < x < \frac{11}{6}\pi$

$D>0$, $\cos x > 0$ $\qquad -\frac{\pi}{2} < x < \frac{\pi}{2}$

Grafico segni:



$$\boxed{\begin{array}{c} \frac{\pi}{2} < x < \frac{7}{6}\pi \\ \vee \\ \frac{3}{2}\pi < x < \frac{11}{6}\pi \end{array}}$$

Va intersecato con le C.E.: $-\frac{\pi}{2} < x < \frac{\pi}{2} \leadsto$ $\boxed{\text{Sol A: } \frac{3}{2}\pi < x < \frac{11}{6}\pi}$

$\leadsto$ Caso 2 a Casa

Sistema a 3

- $\begin{cases} = \\ = \\ = \end{cases}$
- 2 id / semplific.
- 2 eq
- 1 diseq semplice

] 40 punti

- 3 diseq goniometriche
- 1 Trigonometria

] 30 punti

Quesito + Spicy] 10 pti

Esercizio insidioso

Angolo aggiunto

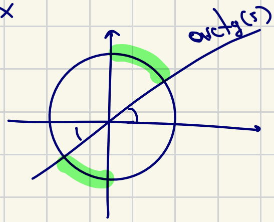
$$\sin x - 5\cos x > 0$$

Idea: Divido per $\cos x$, ma devo stare attento al segno di $\cos x$ perché potrebbe cambiare il segno della diseq.

Furbizia: Moltiplico e divido per $\frac{\cos x}{\cos x} = 1$

$$(\sin x - 5\cos x)\cdot\frac{\cos x}{\cos x} > 0 \rightsquigarrow (\operatorname{tg} x - 5)(\cos x) > 0$$

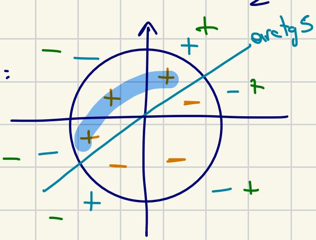
$f_1 > 0$: $\operatorname{tg} x > 5$



$$\boxed{\operatorname{arctg}(5) + k\pi < x < \frac{\pi}{2} + k\pi}$$

$f_2 > 0$: $\cos x > 0$ $\quad -\frac{\pi}{2} < x < \frac{\pi}{2}$

Graf segni:



$$\operatorname{arctg}(5) + 2k\pi < x < \pi + \operatorname{arctg}(5) + 2k\pi$$

Pensare al caso $\cos x = 0$ perché è tutto ok?

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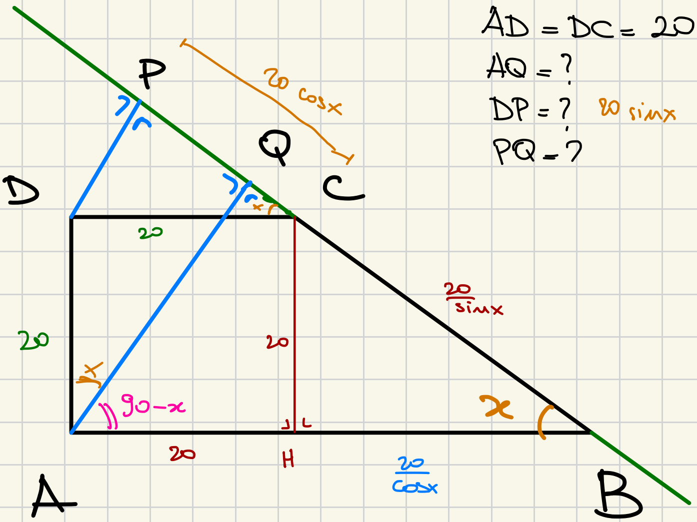

$AD = DC = 20$

$AQ = ?$

$DP = ?$ 20 sinx

$PQ = ?$

⇝ Risolvi in modo che

$AQ = \sqrt{3}\, PD + PQ$

$CB \cdot \sin x = 20$