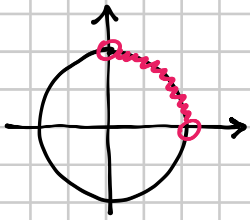
2/12/2022

435 $\ln(\sin x) + \ln(2\cos x) = 0$ $\quad \left[\frac{\pi}{4} + 2k\pi\right]$

C.E.

$$\begin{cases} \sin x > 0 \\ 2\cos x > 0 \end{cases} \qquad \begin{cases} \sin x > 0 \\ \cos x > 0 \end{cases}$$



$$2k\pi < x < \frac{\pi}{2} + 2k\pi$$

$$\ln(\sin x \cdot 2\cos x) = 0$$

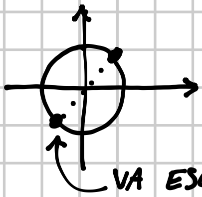
$$\Downarrow$$

$$2\cos x \sin x = 1$$

$$\sin 2x = 1$$

$$2x = \frac{\pi}{2} + 2k\pi$$

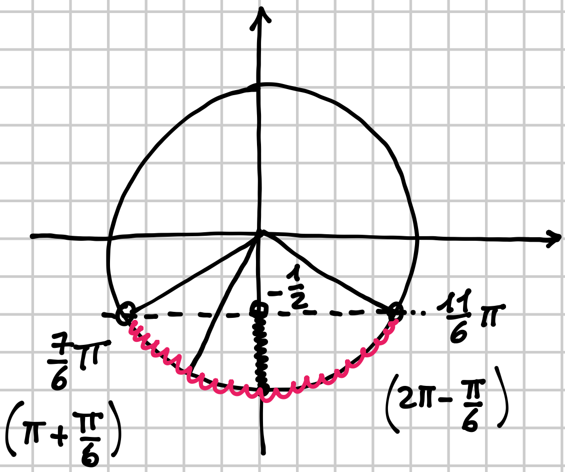
$$\begin{cases} x = \frac{\pi}{4} + k\pi \\ 2k\pi < x < \frac{\pi}{2} + 2k\pi \end{cases}$$



VA ESCLUSO

$$\Rightarrow \boxed{x = \frac{\pi}{4} + 2k\pi}$$

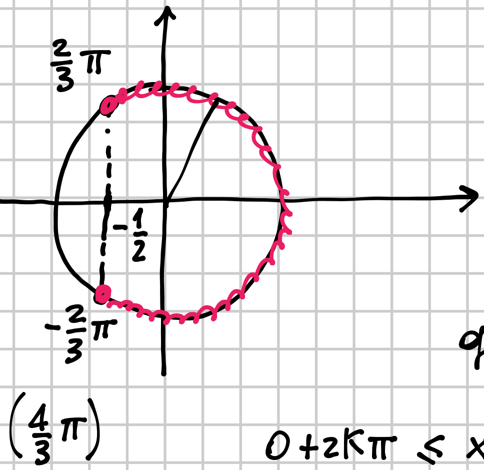
527 $\sin x < -\dfrac{1}{2}$ $\left[\dfrac{7\pi}{6} + 2k\pi < x < \dfrac{11}{6}\pi + 2k\pi\right]$



$\frac{7}{6}\pi + 2k\pi < x < \frac{11}{6}\pi + 2k\pi$

531 $2\cos x \geq -1$ $\left[-\dfrac{2}{3}\pi + 2k\pi \leq x \leq \dfrac{2}{3}\pi + 2k\pi\right]$

$\cos x \geq -\frac{1}{2}$



$\boxed{-\frac{2}{3}\pi + 2k\pi \leq x \leq \frac{2}{3}\pi + 2k\pi}$

oppure

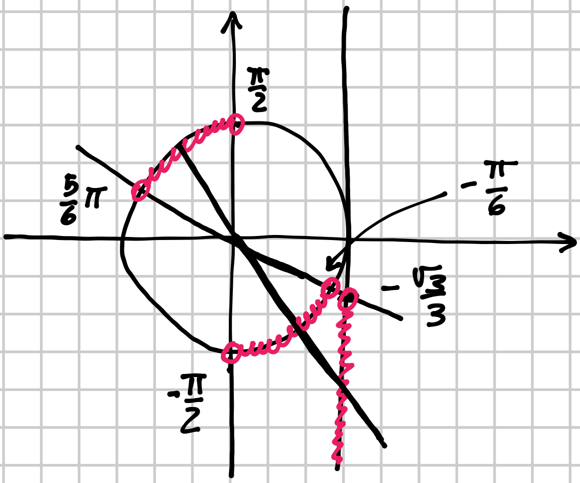
$0 + 2k\pi \leq x \leq \frac{2}{3}\pi + 2k\pi \quad \vee \quad \frac{4}{3}\pi + 2k\pi \leq x \leq 2\pi + 2k\pi$

ma così è più complicato

530 $3\tan x+\sqrt{3}<0$ $\left[\frac{\pi}{2}+k\pi<x<\frac{5\pi}{6}+k\pi\right]$

$3\tan x<-\sqrt{3}$

$\tan x<-\frac{\sqrt{3}}{3}$



$\boxed{-\frac{\pi}{2}+k\pi<x<-\frac{\pi}{6}+k\pi}$

oppure $\frac{\pi}{2}+k\pi<x<\frac{5}{6}\pi+k\pi$

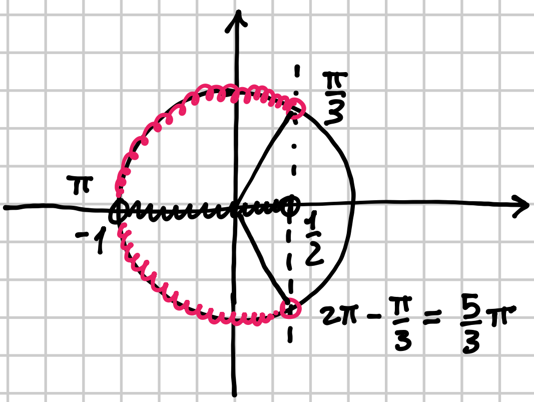
560 $\cos 2x+\cos x<0$

$2\cos^2 x-1+\cos x<0$

$2\cos^2 x+\cos x-1<0$ $\Delta=1+8=9$

$\cos x=\frac{-1\pm 3}{4}=\begin{cases}-1\\ \frac{1}{2}\end{cases}$

$-1<\cos x<\frac{1}{2}$



$\boxed{\frac{\pi}{3}+2k\pi<x<\frac{5}{3}\pi+2k\pi \ \wedge \ x\neq\pi+2k\pi}$

oppure

$\frac{\pi}{3}+2k\pi<x<\pi+2k\pi \ \vee \ \pi+2k\pi<x<\frac{5}{3}\pi+2k\pi$

566 $1-3\cos^2 x-\sin x\cos x \geq 0$

$\sin^2 x+\cos^2 x-3\cos^2 x-\sin x\cos x \geq 0$

(*) $\sin^2 x-2\cos^2 x-\sin x\cos x \geq 0$

$\sin^2 x-\cos^2 x-\cos^2 x-\sin x\cos x \geq 0$

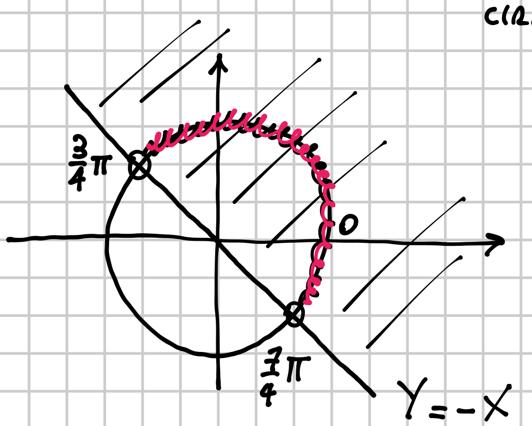
$(\sin x-\cos x)(\sin x+\cos x)-\cos x(\cos x+\sin x) \geq 0$

$\underbrace{(\sin x+\cos x)}_{1}\underbrace{(\sin x-2\cos x)}_{2} \geq 0$

STUDIO IL SEGNO DI 1 e 2

1 $\sin x+\cos x > 0$ $\begin{cases} Y+X>0 \\ X^2+Y^2=1 \end{cases}$ $\begin{cases} Y>-X \\ X^2+Y^2=1 \end{cases}$ SEMIPIANO SUPERIORE DI ORIGINE LA RETTA $Y=-X$ $\downarrow$ esclusa!

CIRC. GONIOM.



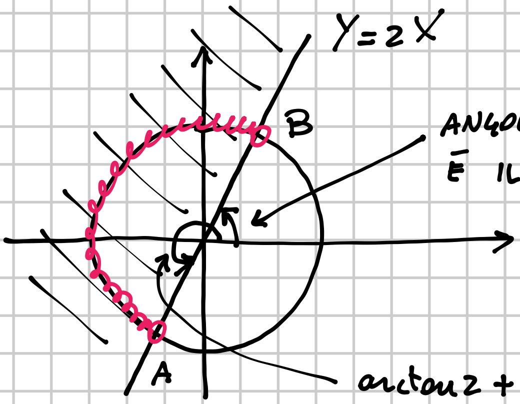
$0 \leq x < \frac{3}{4}\pi$

$\vee$

$\frac{7}{4}\pi < x \leq 2\pi$ con la periodicità....

② $\sin x - 2\cos x > 0$

$$\begin{cases} Y - 2X > 0 \Rightarrow Y > 2X \\ X^2 + Y^2 = 1 \end{cases}$$



ANGOLO LA CUI TANGENTE È IL COEFF. ANGOLARE DELLA RETTA, CIOÈ arctan 2

arctan 2 + π

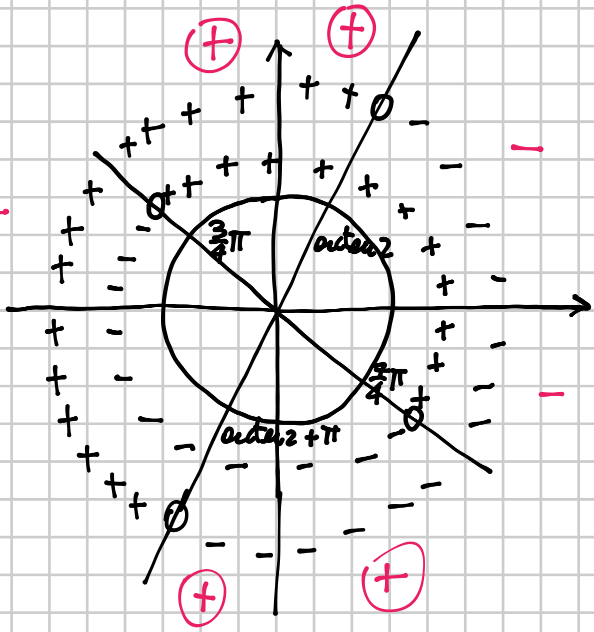
$$\begin{cases} Y = 2X \\ X^2 + Y^2 = 1 \end{cases}$$ trovo i punti A e B

$x^2 + 4X^2 = 1 \qquad 5X^2 = 1$

$$\begin{cases} X = \frac{1}{\sqrt{5}} \\ Y = \frac{2}{\sqrt{5}} \end{cases} \vee \left[\begin{cases} X = -\frac{1}{\sqrt{5}} \\ Y = -\frac{2}{\sqrt{5}} \end{cases}\right]$$ ok, ma non serve

$\arctan 2 < x < \arctan 2 + \pi$ più la periodicità

USO LA REGOLA DEI SEGNI PER RISOLVERE LA DISEQUAZIONE



$$\arctan 2 + 2k\pi \leq x \leq \frac{3}{4}\pi + 2k\pi \ \vee\ \arctan 2 + \pi + 2k\pi \leq x \leq \frac{7}{4}\pi + 2k\pi$$

$$\Downarrow$$

$$\boxed{\arctan 2 + k\pi \leq x \leq \frac{3}{4}\pi + k\pi}$$

<u>OSSERVAZIONE</u> : arrivati a questo punto

(*) $\sin^2 x - 2\cos^2 x - \sin x \cos x \geq 0$

posso dividere per $\cos^2 x$, purché controlli cosa succede per $\cos x = 0$

Se $\cos x = 0$ si ha, sostituendo:

$$\sin^2 x - 2\cdot 0 - \sin x \cdot 0 \geq 0$$

$$\sin^2 x \geq 0 \quad \text{VERA!!} \quad \forall x$$

per cui $\cos x = 0$ È soluzione, e me la tengo da parte: $x = \frac{\pi}{2} + k\pi$

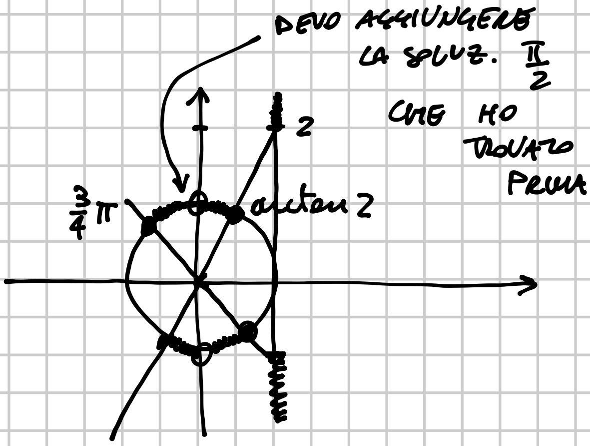
Procedo e divido per $\cos^2 x$

$$\frac{\sin^2 x}{\cos^2 x} - 2\frac{\cancel{\cos^2 x}}{\cancel{\cos^2 x}} - \frac{\sin x \cancel{\cos x}}{\cos^{\cancel{2}} x} \geq 0$$

$$\tan^2 x - \tan x - 2 \geq 0 \qquad \Delta = 1 + 8 = 9$$

$$\tan x = \frac{1 \pm 3}{2} = \begin{cases} -1 \\ 2 \end{cases}$$

$$\tan x \leq -1 \quad \vee \quad \tan x \geq 2$$



$$\boxed{\arctan 2 + k\pi \leq x \leq \frac{3}{4}\pi + k\pi}$$