14/11/2022

$|\cos x| = \cos 3x$ $\quad \left[2k\pi; \frac{\pi}{2} + k\pi; \frac{3}{4}\pi + 2k\pi; \frac{5}{4}\pi + 2k\pi\right]$

Conviene risolvere l'equazione col metodo $|f(x)| = g(x)$

$$\Updownarrow$$

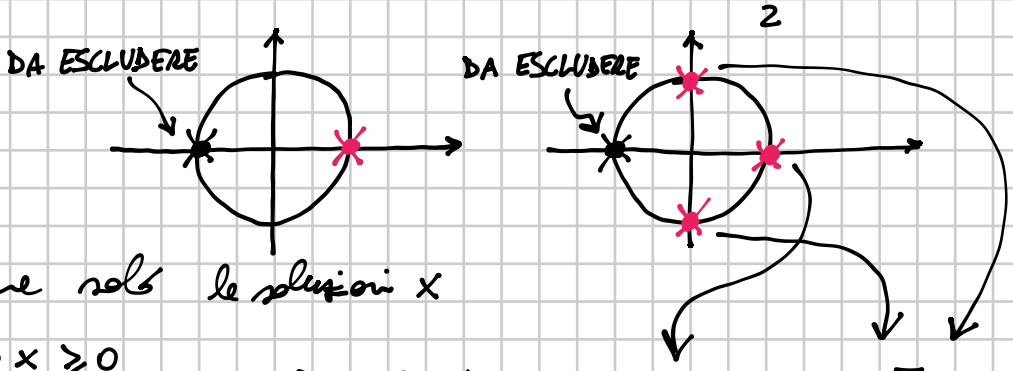
$$\begin{cases} f(x) \geq 0 \\ f(x) = g(x) \end{cases} \vee \begin{cases} f(x) < 0 \\ -f(x) = g(x) \end{cases}$$

① $\begin{cases} \cos x \geq 0 \\ \cos x = \cos 3x \end{cases}$ $\vee$ ② $\begin{cases} \cos x < 0 \\ -\cos x = \cos 3x \end{cases}$

① $\begin{cases} \cos x \geq 0 \\ \cos x = \cos 3x \end{cases}$ $\quad x = 3x + 2k\pi \quad \vee \quad x = -3x + 2k\pi$

$-2x = 2k\pi \quad \vee \quad 4x = 2k\pi$

$x = k\pi \quad \vee \quad x = k\frac{\pi}{2}$



Dobbiamo tenere solo le soluzioni x tali che $\cos x \geq 0$

In definitiva $x = 2k\pi \quad \vee \quad x = \frac{\pi}{2} + k\pi$

② $\begin{cases} \cos x < 0 \\ -\cos x = \cos 3x \end{cases}$ $\quad \cos(\pi - \alpha) = -\cos\alpha$

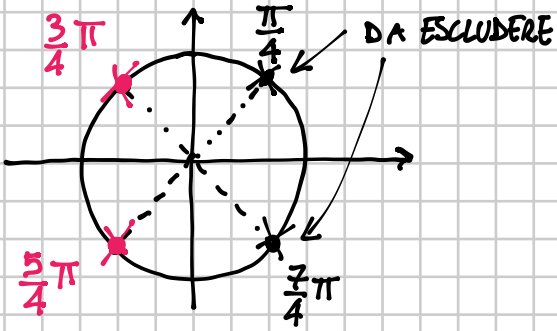
$\Rightarrow \cos(\pi - x) = \cos 3x$

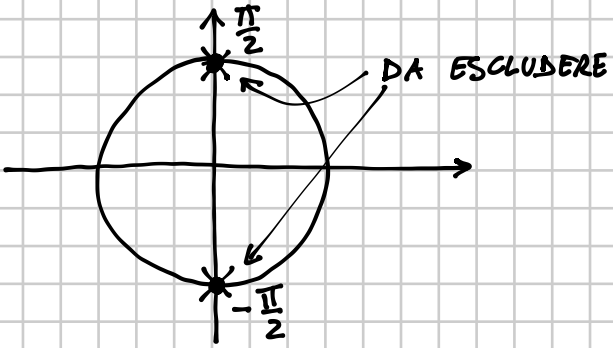
$\pi - x = \pm 3x + 2k\pi$

$$\begin{cases} \cos x < 0 \\ \pi - x = 3x + 2k\pi \quad \vee \quad \pi - x = -3x + 2k\pi \end{cases}$$

$$-4x = -\pi + 2k\pi \quad \vee \quad 2x = -\pi + 2k\pi$$

$$x = \frac{\pi}{4} + k\frac{\pi}{2} \quad \vee \quad x = -\frac{\pi}{2} + k\pi$$





Dobbiamo tenere solo le soluzioni x tali che $\cos x < 0$

In definitiva $x = \frac{3}{4}\pi + 2k\pi \quad \vee \quad x = \frac{5}{4}\pi + 2k\pi$

SOLUZIONE FINALE:

$$\boxed{x = 2k\pi \quad \vee \quad x = \frac{\pi}{2} + k\pi \quad \vee \quad x = \frac{3}{4}\pi + 2k\pi \quad \vee \quad x = \frac{5}{4}\pi + 2k\pi}$$