$$\operatorname{sen} x - \sqrt{3}\cos x = 2$$

$$\frac{2t}{1+t^2} - \sqrt{3}\,\frac{(1-t^2)}{1+t^2} = 2$$

$$2t - \sqrt{3}\,(1-t^2) = 2(1+t^2)$$

$$2t - \sqrt{3} + \sqrt{3}\,t^2 = 2 + 2t^2$$

$$(\sqrt{3}-2)t^2 + 2t - \sqrt{3} - 2 = 0$$

$$\operatorname{sen} x = \frac{2t}{1+t^2}$$

$$\cos x = \frac{1-t^2}{1+t^2}$$

$$t = \operatorname{tg}\frac{x}{2}$$

$$x \neq \pi + k\pi$$

$$(\sqrt{3}-2)t^2 + 2t + (-\sqrt{3}-2) = 0$$

$$\Delta = b^2 - 4ac = 4 - 4(\sqrt{3}-2)(-\sqrt{3}-2) = 0$$

$$\Delta = 4 - 4(-3+4) = 4 - 4(1) = 4 - 4 = 0$$

$$t_1 = t_2 = -\frac{b \pm \sqrt{\Delta}}{2a} = \frac{-\cancel{2}}{\cancel{2}(\sqrt{3}-2)} = \frac{1}{2-\sqrt{3}}$$

$$t_1 = t_2 = \underbrace{\frac{1}{2-\sqrt{3}}}_{(A-B)} \cdot \underbrace{\frac{2+\sqrt{3}}{2+\sqrt{3}}}_{(A+B)} = \frac{2+\sqrt{3}}{4-3} = 2+\sqrt{3}$$

$$tg\frac{x}{2} = t$$

$$\boxed{t_1 = t_2 = 2+\sqrt{3}}$$

$$tg\frac{x}{2} = 2+\sqrt{3}$$

$$\frac{x}{2} = arctg(2+\sqrt{3})$$

$$\frac{5}{\cancel{12}_6} \cdot \cancel{2}$$

$$\frac{x}{2} = \frac{5}{12}\pi + k\pi$$

$$\frac{5}{\cancel{6}_1} \cdot \cancel{180}^{30} = 150$$

$$\boxed{x = \frac{5}{6}\pi + 2k\pi, \ k \in \mathbb{Z}}$$

$$\sqrt{3}\ \text{sen}x + \cos x + 1 = 0$$

$$x \neq \pi + 2k\pi$$
$$k \in \mathbb{Z}$$

$$\text{tg}\frac{x}{2} = t$$

$$\sqrt{3}\left(\frac{2t}{1+t^2}\right) + \frac{1-t^2}{1+t^2} + 1 = 0$$

$$\frac{2\sqrt{3}t + 1 - \cancel{t^2} + 1 + \cancel{t^2}}{1+t^2} = 0$$

$$\cancel{(1+t^2)}\ \frac{2\sqrt{3}t + 2}{\cancel{1+t^2}} = 0 \quad \cdot (1+t^2)$$

$$2\sqrt{3}t + 2 = 0 \Longrightarrow 2(\sqrt{3}t + 1) = 0$$

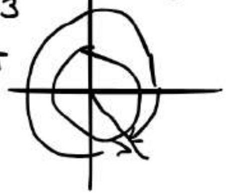
$\sqrt{3}\,t + 1 = 0$

$\sqrt{3}\,t = -1 \Rightarrow t = -\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

$\frac{5}{\cancel{3}} \cdot \cancel{180}^{60} = 300^\circ = -60^\circ$

$t = -\frac{\sqrt{3}}{3}$ $\quad t = tg\,\frac{x}{2} \Rightarrow tg\,\frac{x}{2} = -\frac{\sqrt{3}}{3}$

$\frac{x}{2} = arctg\left(-\frac{\sqrt{3}}{3}\right)$ $\quad \frac{x}{2} = \frac{5}{6}\pi + k\pi$



$-\frac{\pi}{3}$

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

$$\operatorname{sen} x - \cos x - 1 = 0$$

$$\frac{2t}{1+t^2} - \frac{(1-t^2)}{1+t^2} - 1 = 0$$

$$\cancel{1+t^2} \cdot \frac{2t - (1-t^2) - (1+t^2)}{\cancel{1+t^2}} = 0 \cdot 1+t^2$$

$$2t - 1 + \cancel{t^2} - 1 - \cancel{t^2} = 0$$

$$2t - 2 = 0$$

$$2(t-1) = 0$$

$$t - 1 = 0 \Rightarrow \boxed{t = 1}$$

$$\operatorname{sen} x = \frac{2t}{1+t^2}$$

$$\cos x = \frac{1-t^2}{1+t^2}$$

$$x \neq \pi + 2k\pi$$

$$t = \operatorname{tg} \frac{x}{2}$$

$$\frac{x}{2} = \operatorname{arctg} 1 \implies \frac{x}{2} = \frac{\pi}{4} + k\pi$$

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

$$3\,\operatorname{sen} x + \sqrt{3}\cos x + \sqrt{3} = 0$$

$$3\cdot\left(\frac{2t}{1+t^2}\right) + \sqrt{3}\left(\frac{1-t^2}{1+t^2}\right) + \sqrt{3} = 0$$

$$\frac{6t + \sqrt{3} - \sqrt{3}t^2 + \sqrt{3}(1+t^2)}{\cancel{(1+t^2)}} = 0$$

$$6t + \sqrt{3} \cancel{- \sqrt{3}t^2} + \sqrt{3} \cancel{+ \sqrt{3}t^2} = 0$$

$$6t + 2\sqrt{3} = 0 \qquad 6t = -2\sqrt{3} \Rightarrow t = -\frac{\cancel{2}\sqrt{3}}{\cancel{6}\,3}$$

$$\operatorname{sen} x = \frac{2t}{1+t^2}$$

$$\cos x = \frac{1-t^2}{1+t^2}$$

$$t = \operatorname{tg}\frac{x}{2}$$

$$x \neq \pi + 2k\pi$$
$$k \in \mathbb{Z}$$

$t = -\frac{\sqrt{3}}{3}$ $\qquad\qquad t = tg\frac{x}{2}$

$tg\frac{x}{2} = -\frac{\sqrt{3}}{3} \Rightarrow \frac{x}{2} = arctg\left(-\frac{\sqrt{3}}{3}\right) \rightarrow -\frac{\pi}{3}$

$\frac{x}{2} = \frac{5}{6}\pi + k\pi \Rightarrow \boxed{x = \frac{5}{3}\pi + 2k\pi}$

$a, b, c \in \mathbb{R}$

EQUAZIONI OMOGENEE DI 2° GRADO IN SENO E COSENO

$$\underline{a\,\text{sen}^2 x} + \underline{b\,\text{sen}x\cos x} + \underline{c\cos^2 x} = 0$$

$\boxed{\cos^2 x}$ $\quad \frac{\text{sen}x}{\cos x} = \text{tg}x$

Generalmente si divide tutto per coseno al quadrato

$$a\frac{\text{sen}^2 x}{\cos^2 x} + b\frac{\text{sen}x\,\cancel{\cos x}}{\cos^{\cancel{2}} x} + c\frac{\cancel{\cos^2 x}}{\cancel{\cos^2 x}} = 0$$

$\cos x \neq 0$

$\boxed{x \neq \frac{\pi}{2} + k\pi}$

$$\boxed{a\,\text{tg}^2 x + b\,\text{tg}x + c = 0}$$

Equazione di secondo grado in tangente di x

$$\sqrt{3}\cos^2 x + 3\cos x \,\mathrm{sen}\, x = 0$$

$$\cos^2 x \neq 0$$

$$\cos x \neq 0$$

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

$$\sqrt{3} + 3\,\mathrm{tg}\, x = 0$$

$$3\,\mathrm{tg}\, x = -\sqrt{3} \Longrightarrow \boxed{\mathrm{tg}\, x = -\frac{\sqrt{3}}{3}}$$

LA

INIQUDI

$$x = \mathrm{arctg}\left(-\frac{\sqrt{3}}{3}\right) \Rightarrow \boxed{x = \frac{5}{6}\pi + k\pi}$$

$$\sqrt{3}\cos^2 x + 3\cos x \,\text{sen}\, x = 0$$

$$\cos x\left(\sqrt{3}\cos x + 3\,\text{sen}\, x\right) = 0$$

$$\boxed{\cos x = 0} \qquad \boxed{\sqrt{3}\cos x + 3\,\text{sen}\, x = 0}$$

$$\operatorname{sen}^2 x - (1+\sqrt{3})\operatorname{sen} x \cos x + \sqrt{3}\cos^2 x = 0$$

$$\operatorname{tg}^2 x - (1+\sqrt{3})\operatorname{tg} x + \sqrt{3} = 0$$

$$\Delta = \left[-(1+\sqrt{3})\right]^2 - 4(1)(\sqrt{3}) =$$

$$= 1 + 3 + 2\sqrt{3} - 4\sqrt{3} = 4 - 2\sqrt{3}$$

$$(\operatorname{tg} x)_1 ; (\operatorname{tg} x)_2 = \frac{1+\sqrt{3} - \sqrt{4-2\sqrt{3}}}{2}$$

$\cos^2 x \neq 0$

$\cos x \neq 0$

$$\boxed{x \neq \frac{\pi}{2} + k\pi}$$

$$(\operatorname{tg}x)_1, (\operatorname{tg}x)_2 = \frac{1+\sqrt{3} \pm \sqrt{4-2\sqrt{3}}}{2} \qquad \sqrt{4-\sqrt{12}}$$

$$\sqrt{a-\sqrt{b}} = \sqrt{\frac{a+\sqrt{a^2-b}}{2}} - \sqrt{\frac{a-\sqrt{a^2-b}}{2}}$$

$$\sqrt{4-\sqrt{12}} = \sqrt{\frac{4+\sqrt{16-12}}{2}} - \sqrt{\frac{4-\sqrt{16-12}}{2}} =$$

$$= \sqrt{\frac{4+2}{2}} - \sqrt{\frac{4-2}{2}} = \sqrt{\frac{\cancel{6}^{3}}{\cancel{2}_{1}}} - \sqrt{\frac{\cancel{2}^{1}}{\cancel{2}_{1}}}$$

$$= \sqrt{3} - \sqrt{1} = (\sqrt{3}-1)$$

$$(\operatorname{tg}x)_1; (\operatorname{tg}x)_2 = \frac{1+\sqrt{3} \pm (\sqrt{3}-1)}{2}$$

$$\to \frac{1+\cancel{\sqrt{3}}-\cancel{\sqrt{3}}+1}{2} = \frac{\cancel{2}^{1}}{\cancel{2}_{1}} = 1$$

$$\to \frac{\cancel{1}+\sqrt{3}+\sqrt{3}-\cancel{1}}{2} = \frac{\cancel{2}\sqrt{3}}{\cancel{2}} = \sqrt{3}$$

$\operatorname{tg}x = 1$

$x = \operatorname{arctg} 1$

$x = \frac{\pi}{4} + k\pi$

$\operatorname{tg}x = \sqrt{3}$

$x = \operatorname{arctg}\sqrt{3}$

$x = \frac{\pi}{3} + k\pi$

$k \in \mathbb{Z}$

$$\sqrt{3}\,\operatorname{sen}x\cos x + \operatorname{sen}^2 x = 0$$

$$\sqrt{3}\,\operatorname{tg}x + \operatorname{tg}^2 x = 0$$

$$\operatorname{tg}x\left(\operatorname{tg}x + \sqrt{3}\right) = 0$$

$\operatorname{tg}x = 0$

$\underline{x = k\pi,\ k \in \mathbb{Z}}$

$\operatorname{tg}x = -\sqrt{3}$

$x = \operatorname{arctg}(-\sqrt{3})$

$\underline{x = \frac{2}{3}\pi + k\pi,\ k \in \mathbb{Z}}$

$\cos^2 x = 0$

$\cos x = 0$

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