PRACTICAL PART:

Solutions

1. Solve the equation $3 - 6\cos x = 0$.

$3 = 6\cos x$

$\cos x = \frac{1}{2}$

$\boxed{x = \frac{\pi}{3} + 2\pi n,\ n \in \mathbb{Z} \qquad x = -\frac{\pi}{3} + 2\pi n,\ n \in \mathbb{Z}}$

2. Solve the equation $\tan^2 x - 1 = 2$.

$\tan^2 x = 3$

$\tan x = \pm\sqrt{3}$

$\tan x = \sqrt{3}$

$\boxed{x = \frac{\pi}{3} + \pi n,\ n \in \mathbb{Z}}$

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

$\boxed{x = -\frac{\pi}{3} + \pi n,\ n \in \mathbb{Z}}$

3. Solve the equation $\sin^2 x - \sin x = \sin x + 3$.

$$\sin^2 x - 2\sin x - 3 = 0$$

$$t^2 - 2t - 3 = 0$$

$$(t-3)(t+1) = 0$$

$\sin x = 3$ $\qquad$ $\sin x = -1$

No real Solution

$$\boxed{x = \frac{3\pi}{2} + 2\pi n, \ n \in \mathbb{Z}}$$

4. Solve the equation $-2\cos^2 x + 1 = \sin x$.

$$-2(1 - \sin^2 x) + 1 = \sin x$$

$$2\sin^2 x - 1 - \sin x = 0$$

$$2t^2 - t - 1 = 0$$

$$(2\sin x + 1)(\sin x - 1) = 0$$

$\sin x = -\frac{1}{2}$ $\qquad$ $\sin x = 1$

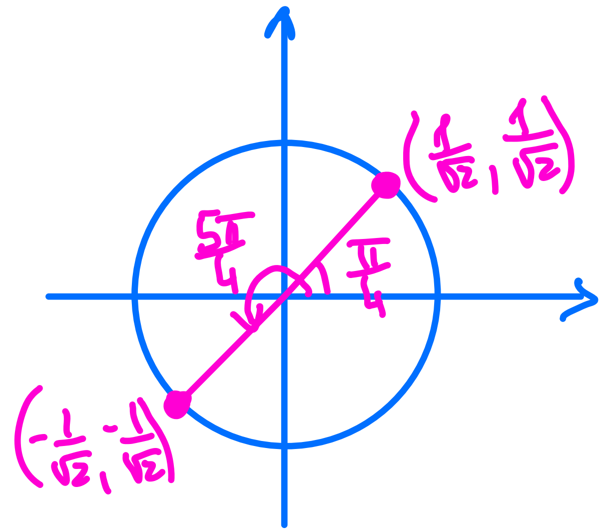
$$\boxed{\begin{array}{l} x = -\frac{\pi}{6} + 2\pi n, \ n \in \mathbb{Z} \\ x = -\frac{5\pi}{6} + 2\pi n \end{array}}$$

$$\boxed{x = \frac{\pi}{2} + 2\pi n, \ n \in \mathbb{Z}}$$

5. Solve the equation $\sin x = \cos x$ on the interval $[0, 2\pi)$.

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

$x = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$



6. Solve the equation $\sin x - 1 = \cos x$ on the interval $[0, 2\pi)$.

$\sin x - 1 = \cos x$

$1 - \cos^2 x - 1 = \cos x$

$\cos^2 x + \cos x = 0$

$\cos x(\cos x + 1) = 0$

$\cos x = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}$

$\cos x = -1$

$x = \pi$

Check: $\sin \frac{3\pi}{2} - 1 = \cos \frac{3\pi}{2}$

$-2 = 0$ False

Answer: $\boxed{x = \frac{\pi}{2}, \pi.}$

7. Solve the equation $\tan^2 x + 2\tan x = 3$ on the interval $(-\pi/2, \pi/2)$.

$$t^2+2t-3=0$$

$$(t+3)(t-1)=0$$

$\tan x=-3$ $\qquad$ $\tan x = 1$

$\boxed{x=\arctan(-3)}$ $\qquad$ $\boxed{x=\frac{\pi}{4}}$

8. Solve the equation $6\sin x - 2 = \sin x$ on the interval $[0, 2\pi)$.

$$6\sin x-\sin x=2$$

$$5\sin x=2$$

$$\sin x = \frac{2}{5}$$

$x=\arcsin\left(\frac{2}{5}\right)$ or $x=\pi-\arcsin\left(\frac{2}{5}\right)$