

Tips:

1. If the equation involves functions of BOTH $2x$ and x , use the double angle identities to change all functions of $2x$ into functions of just x .
2. If the equation involves JUST functions of $2x$, solve for $2x$, and then solve for x . Don't forget to list ALL solutions by adding the period.
3. Don't ever divide both sides by a function of the variable (don't divide away an x)... this should sound familiar. JUST SAY NO!
4. Visualize the graph when possible if this helps you.

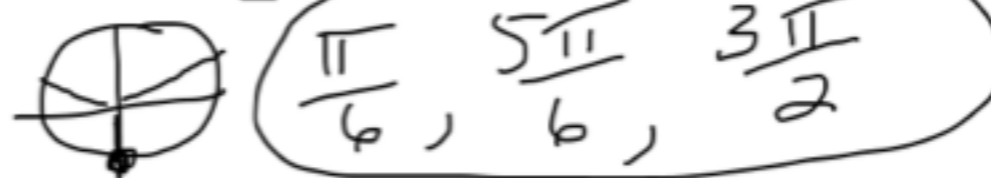
1. Solve $\cos 2x - \sin x = 0$ for $0 \leq x < 2\pi$ by using identities.

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

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

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

\swarrow $\sin x = \frac{1}{2}$ \searrow $\sin x = -1$



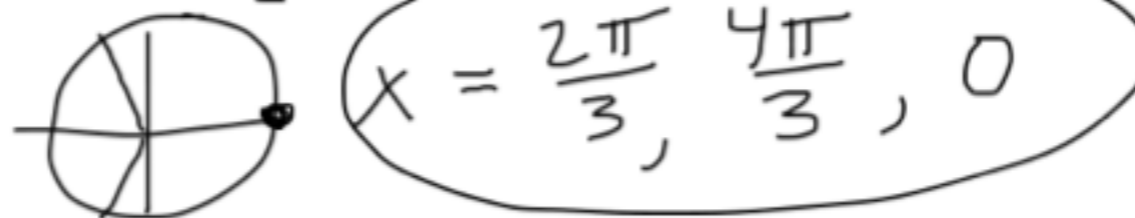
2. Solve $\cos 2x = \cos x$ for $0 \leq x < 2\pi$.

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

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

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

\swarrow $\cos x = -\frac{1}{2}$ \searrow $\cos x = 1$



3. Solve $\sin 3x = \cos 3x$ for $0^\circ \leq x < 360^\circ$. (Hint: Remember the option to arrange sine and cosine as tangent...)

$$\frac{\sin 3x}{\cos 3x} = 1$$

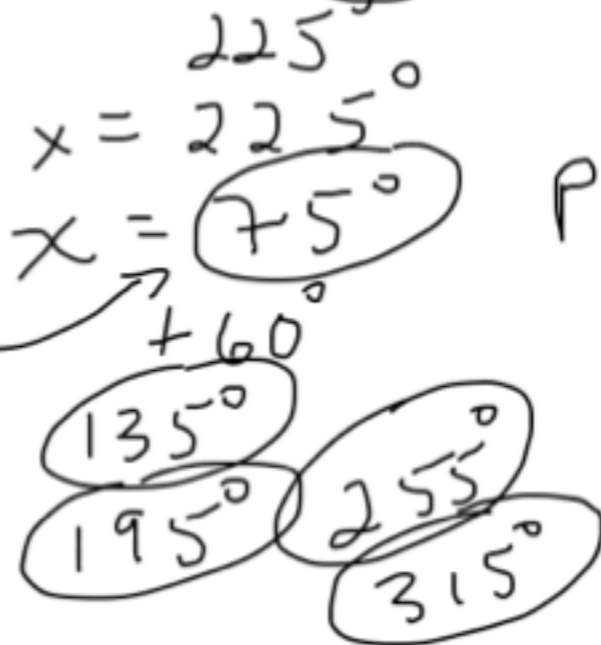
$$\tan 3x = 1$$

$$3x = 45^\circ \text{ or } 225^\circ$$

$$x = 15^\circ$$

$$+60^\circ = 75^\circ$$

$$\tan \theta = 1 \quad 45^\circ$$



$$P = \frac{1}{5} = \frac{2}{10}$$

$$= \frac{3}{15}$$

$$= \frac{6}{30}$$

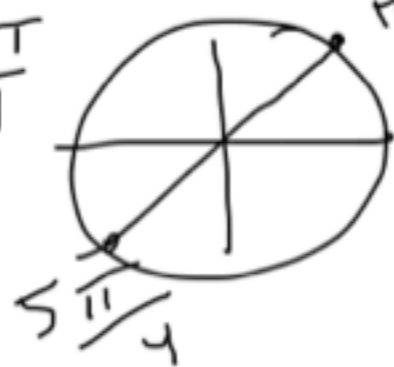
4. Solve $\tan\left(x - \frac{\pi}{18}\right) = 1$ for $0 \leq x < 2\pi$.

$$x - \frac{\pi}{18} = \frac{\pi}{4} \text{ or } x - \frac{\pi}{18} = \frac{5\pi}{4}$$

$$x - \frac{2\pi}{36} = \frac{9\pi}{36}$$

$$x = \frac{11\pi}{36}$$

$$\tan \theta = 1 \quad \pi/4$$



$$x - \frac{2\pi}{36} = \frac{45\pi}{36}$$

$$x = \frac{47\pi}{36}$$

5. $\cos 4x = 1 - 3\cos 2x$ for $0 \leq x < 2\pi$.

$$2\cos^2(2x) - 1 = 1 - 3\cos(2x)$$

$$2\cos^2(2x) + 3\cos(2x) - 2 = 0$$

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

$$\cos(2x) = u$$

period = π

$$(2u - 1)(u + 2) = 0$$

$$u = \cos 2x = \frac{1}{2} \text{ or } u = \cos 2x = -2$$

$$2x = \frac{\pi}{3} \text{ or } 2x = \frac{5\pi}{3}$$

$$x = \frac{\pi}{6}$$

$$x = \frac{5\pi}{6}$$

$$+ \frac{6\pi}{6} = \frac{7\pi}{6}$$

$$+ \frac{6\pi}{6} = \frac{11\pi}{6}$$

