Precalculus

Topic: Basic Trigonometric Equations

Instructions

Solve the following basic trigonometric equations. Show all work clearly and check your solutions.

Practice Problems

1. **Solve the given equation, and list six specific solutions.**

   (i) $\sin x = \frac{1}{2}$
   (ii) $\cos x = \frac{\sqrt{2}}{2}$
   (iii) $\tan x = 1$
   (iv) $\sin x = 0$
   (v) $\cos x = -1$
   (vi) $\tan x = 0$
   (vii) $\sin x = -\frac{1}{2}$
   (viii) $\cos x = 0$
   (ix) $\tan x = \sqrt{3}$
   (x) $\sin x = 1$

2. **Solve the following equations for x within the interval $0 \leq x < 2\pi$:**

   (i) $2\sin x - 1 = 0$
   (ii) $3\cos x + 1 = 0$
   (iii) $\sin x = \cos x$
   (iv) $1 - \tan^2 x = 0$
   (v) $\sin x = \frac{\sqrt{3}}{2}$
   (vi) $\cos x = -\frac{1}{2}$
   (vii) $\tan x = 0$
   (viii) $\cos 2x = 1$
   (ix) $\sin x = -\frac{\sqrt{2}}{2}$
   (x) $\tan x = \frac{1}{\sqrt{3}}$

3. **Solve for all values of x satisfying the equation:**

(i) $\sin x = \cos x$

(ii) $\cos 2x = \sin x$

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

(iv) $\cos x = -\sin x$

(v) $1 + \tan^2 x = 2$

(vi) $\sin x = \frac{1}{\sqrt{2}}$

(vii) $\cos x = \sin x$

(viii) $1 - \cos^2 x = 0$

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

(x) $\tan x = -1$

4. **Find the general solution for the following trigonometric equations:**

(i) $\sin x = \frac{1}{2}$

(ii) $\cos x = -\frac{\sqrt{3}}{2}$

(iii) $\tan x = 1$

(iv) $\sin x = 0$

(v) $\cos x = \frac{1}{2}$

(vi) $\tan x = -\sqrt{3}$

(vii) $\sin x = -1$

(viii) $\cos x = 1$

(ix) $\tan x = 0$

(x) $\sin x = -\frac{\sqrt{3}}{2}$

5. **Solve the following trigonometric equations for x within the given interval:**

(i) $\sin(2x) = 1,\ 0 \leq x < 2\pi$

(ii) $\cos(3x) = 0,\ 0 \leq x < 2\pi$

(iii) $\tan(2x) = \sqrt{3},\ 0 \leq x < 2\pi$

(iv) $\sin(3x) = 0,\ 0 \leq x < 2\pi$

(v) $\cos(4x) = 0,\ 0 \leq x < 2\pi$

(vi) $\sin(2x) = 0,\ 0 \leq x < 2\pi$

(vii) $\tan(3x) = 1,\ 0 \leq x < 2\pi$

(viii) $\sin(5x) = \frac{1}{2},\ 0 \leq x < 2\pi$

(ix) $\cos(6x) = -1,\ 0 \leq x < 2\pi$

(x) $\tan(4x) = 0,\ 0 \leq x < 2\pi$

Multiple-Choice Questions

1. What is the general solution for $\sin x = 0$?

A. $x = n\pi$, where $n \in \mathbb{Z}$

B. $x = \frac{\pi}{2} + n\pi$, where $n \in \mathbb{Z}$

C. $x = \frac{\pi}{4} + n\pi$, where $n \in \mathbb{Z}$

D. $x = 0$, where $n \in \mathbb{Z}$

2. What is the solution for $\tan x = 0$?

A. $x = n\pi$, where $n \in \mathbb{Z}$

B. $x = \frac{\pi}{2} + n\pi$, where $n \in \mathbb{Z}$

C. $x = \frac{\pi}{4} + n\pi$, where $n \in \mathbb{Z}$

D. $x = \frac{\pi}{2}$, where $n \in \mathbb{Z}$

3. What is the solution for $\cos x = \frac{\sqrt{2}}{2}$?

A. $x = \frac{\pi}{4} + 2n\pi$, where $n \in \mathbb{Z}$

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

C. $x = \frac{\pi}{2} + 2n\pi$, where $n \in \mathbb{Z}$

D. $x = \frac{\pi}{6} + 2n\pi$, where $n \in \mathbb{Z}$