Precalculus

Topic: Trigonometric Graphs

Instructions

Solve the following problems related to trigonometric graphs. Show all work clearly and check your solutions.

Practice Problems

1. **Graph the following functions:**

   (i) $f(x) = 1 + \cos x$
   (ii) $f(x) = -\sin x$
   (iii) $f(x) = 2 - 2\cos x$
   (iv) $f(x) = 1 + \cos x$
   (v) $g(x) = 3\cos x$
   (vi) $g(x) = \frac{2}{3}\sin x$
   (vii) $h(x) = 3 + 3\cos x$
   (viii) $h(x) = |\cos x|$

2. **Find the amplitude and period of the function, and sketch its graph:**

   (i) $y = \cos 2x$
   (ii) $y = -\sin 2x$
   (iii) $y = \frac{1}{2}\cos 4x$
   (iv) $y = 10\sin \frac{1}{2}x$
   (v) $y = 5\cos \frac{3}{4}x$
   (vi) $y = 4\sin(-2x)$
   (vii) $y = -3\sin \pi x$
   (viii) $y = -2\cos 4\pi x$

3. **Find the amplitude, period, and phase shift of the function, and graph one complete period:**

(i) $y = \cos\left(x - \frac{\pi}{2}\right)$
(ii) $y = 2\sin\left(x - \frac{\pi}{3}\right)$
(iii) $y = 3\cos\left(x + \frac{\pi}{4}\right)$
(iv) $y = \sin\left(\frac{x+\pi}{4}\right)$
(v) $y = 1\frac{1}{2}\cos x$
(vi) $y = \sin\left(\frac{2x}{3} - \frac{\pi}{4}\right)$
(vii) $y = 3\cos\left(\frac{3x}{2} - \frac{\pi}{3}\right)$
(viii) $y = 1 + \cos\left(3x - \frac{\pi}{2}\right)$

4. **Find the maximum and minimum values of the following functions:**

(i) $y = \sin x + \sin 2x$
(ii) $y = x - 2\sin x, 0 \leq x \leq 2\pi$
(iii) $y = 2\sin x + \sin^2 x$
(iv) $y = \frac{\cos x}{2+\sin x}$
(v) $y = \sin x + \cos 2x$
(vi) $y = \cos x + \sin^2 x$

5. **Find all solutions of the equation that lie in the interval $[0, \pi]$. State each answer correct to two decimal places:**

(i) $\cos x = 0.4$
(ii) $\tan x = 2$
(iii) $\csc x = 3$
(iv) $\cos x = x$
(v) $\sin x = 0.5$
(vi) $\tan x = -1$

Multiple-Choice Questions

1. Find the solutions to $\cos x = \frac{1}{2}$ in the interval $[0, 2\pi]$.

A. $\frac{\pi}{3}, \frac{5\pi}{3}$
B. $\frac{\pi}{6}, \frac{5\pi}{6}$
C. $\frac{\pi}{4}, \frac{3\pi}{4}$
D. $\frac{\pi}{3}, \frac{2\pi}{3}$

2. What is the period of the function $y = \sin 4x$?

A. $\frac{\pi}{2}$
B. π
C. 4
D. 2

3. What is the phase shift of the function $y = 2\cos\left(x - \frac{\pi}{3}\right)$?

A. $\frac{\pi}{3}$
B. $-\frac{\pi}{3}$
C. 0
D. $\frac{\pi}{2}$

4. What is the amplitude of the function $y = -2\cos\left(x + \frac{\pi}{4}\right)$?

A. 2
B. -2
C. $\frac{1}{2}$
D. 1