PRINTABLE VERSION

Quiz 12

You scored 100 out of 100

Question 1

Your answer is CORRECT.

Solve $\cos(4x) = 1$ on the interval $[\,0\,,\ \pi/2\,]$.

$\cos(x) = 1 \rightarrow [0, 2\pi]$

$x = 0, 2\pi$

$4x = 0 + 2\pi k \qquad 4x = 2\pi + 2\pi k$

$x = \frac{0}{2} + \frac{\pi}{2}k \qquad x = \frac{\pi}{2} + \frac{\pi}{2}k$

$k=0$ $\quad x = 0 \qquad x = \frac{\pi}{2}$

$k=1$ $\quad x = \frac{\pi}{2}$ (repeat) $\qquad x = \frac{2\pi}{2} = \pi$ ✗

a) $x = 0\,,\ x = \pi/4$

b) $x = \pi/8$

c) $x = 0\,,\ x = \pi/12$

d) $x = 0$

e) $x = 0,\ x = \pi/2$

f) None of the above.

Question 2

Your answer is CORRECT.

Solve $\cos(7x) = 0$ on the interval $[\,0\,,\ 2\pi/7\,]$

$\cos(x) = 0 \rightarrow [0, 2\pi]$

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

$7x = \frac{\pi}{2} + 2\pi k \qquad 7x = \frac{3\pi}{2} + 2\pi k$

$x = \frac{\pi}{14} + \frac{2\pi k}{7} \qquad x = \frac{3\pi}{14} + \frac{2\pi k}{7}$

$x = \frac{\pi}{14} + \frac{4\pi k}{14} \qquad x = \frac{3\pi}{14} + \frac{4\pi k}{14}$

$[\frac{0}{14}, \frac{4\pi}{14}]$

$k=0$ $\quad x = \pi/14$ ✓ $\qquad x = 3\pi/14$ ✓

$k=1$ $\quad x = 5\pi/14$ ✗ $\qquad x = 7\pi/14$ ✗

a) $x = \pi/8$

b) $x = \pi/7$

c) $x = \pi/14$

d) $x = 0\,,\ x = 2\pi/7$

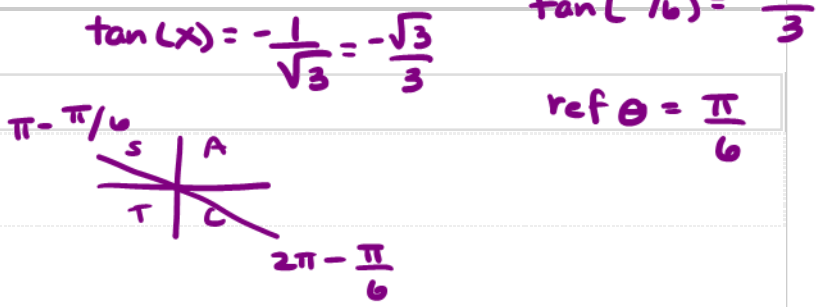
e) $x = \pi/14\,,\ x = 3\pi/14$

f) None of the above.

Question 3

Your answer is CORRECT.

Solve $\cot(x) = -\sqrt{3}$ on the interval $[\,0\,,\,2\pi\,)$.



a) $x = \pi/3\,,\ x = 4\pi/3$

b) $x = \pi/4\,,\ x = 5\pi/4$

c) $x = 5\pi/6\,,\ x = 11\pi/6$

d) $x = 2\pi/3\,,\ x = 5\pi/3$

e) $x = \pi/6\,,\ x = 7\pi/6$

f) None of the above.

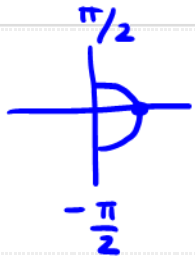
Question 4

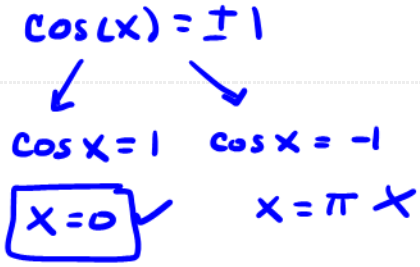
Your answer is CORRECT.

Solve

$\cos^2(x) = 1$

over the interval $[\,-\pi/2\,,\,\pi/2\,]$





a) $\frac{1}{2}\pi$

b) $-\frac{1}{2}\pi$

c) $\left\{0, \frac{1}{2}\pi\right\}$

d) 0

e) $\left\{-\frac{1}{2}\pi, \frac{1}{2}\pi\right\}$

Question 5

Your answer is CORRECT.

Solve

$6\sin(x)\cos^2(x) = 6\sin(x)$

on the interval [-2π , 0]

$6\sin(x)\cos^2(x) - 6\sin(x) = 0$

$6\sin(x)(\cos^2(x) - 1) = 0$

$6\sin(x) = 0$

$\sin(x) = 0$

$x = 0, -\pi, -2\pi$

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

$\cos^2(x) = 1$

$\cos(x) = 1$ $\quad$ $\cos(x) = -1$

$x = 0, -\pi$ $\quad$ $x = -2\pi$

a) $\left\{-\frac{3}{4}\pi, -\frac{1}{4}\pi\right\}$

b) *No Solution*

c) $\left\{0, -\pi, -\frac{1}{4}\pi\right\}$

d) $\left\{0, -\frac{3}{2}\pi, -\frac{1}{2}\pi\right\}$

e) $\{0, -2\pi, -\pi\}$

Question 6

Your answer is CORRECT.

Solve

$\sin(2x) = -7\cos(x)$

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

on the interval [0 , 2π].

$2\sin(x)\cos(x) + 7\cos(x) = 0$

$\cos(x)(2\sin(x) + 7) = 0$

$\cos(x) = 0$

$x = \pi/2$

$x = 3\pi/2$

$2\sin(x) + 7 = 0$

$2\sin(x) = -7$

$\sin(x) = -7/2 \notin [-1, 1]$

NO SOLUTION

a) $\{x = 0, x = \pi\}$

b) $x = \frac{3}{2}\pi$

c) *No solution*

d) $x = \frac{1}{2}\pi$

e) $\left\{x = \frac{1}{2}\pi, x = \frac{3}{2}\pi\right\}$

Question 7

Your answer is CORRECT.

Solve

$$7\sin^2(x) = 7\cos^2(x)$$

over the interval [-π, π].

a) $\left\{-\frac{3}{4}\pi, -\frac{1}{4}\pi, \frac{1}{4}\pi, \frac{3}{4}\pi\right\}$

b) $\left\{\frac{1}{12}\pi, \frac{5}{12}\pi, \frac{7}{12}\pi, \frac{11}{12}\pi\right\}$

c) $\left\{\frac{1}{4}\pi, \frac{1}{6}\pi, \frac{2}{3}\pi\right\}$

d) $\left\{-\frac{2}{3}\pi, -\frac{1}{3}\pi, \frac{1}{3}\pi, \frac{2}{3}\pi\right\}$

e) $\left\{-\frac{5}{6}\pi, -\frac{1}{6}\pi, \frac{1}{6}\pi, \frac{5}{6}\pi\right\}$

$\frac{7\sin^2(x)}{7\cos^2(x)} = \frac{7\cos^2(x)}{7\cos^2(x)}$

$\tan^2(x) = 1$

$\tan(x) = 1$: $x = -3\pi/4$, $x = \pi/4$

$\tan(x) = -1$: $x = -\pi/4$, $x = 3\pi/4$

Question 8

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

$$2\sin^2(x) + 13\sin(x) - 7 = 0$$

a) $x = \pi/2$

b) $x = 7\pi/6\,,\quad x = 11\pi/6$

c) $x = \pi/3\,,\quad x = 2\pi/3$

d) $x = \pi/6\,,\quad x = 5\pi/6$

e) $x = 4\pi/3\,,\quad x = 5\pi/3$

f) None of the above.

$(2\sin(x) - 1)(\sin x + 7) = 0$

$2\sin x = 1$

$\sin x = 1/2$

$x = \pi/6$

$x = 5\pi/6$

$\sin x = -7$ & $[-1,1]$ NOT POSSIBLE

Question 9

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

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

a) $x = 0\,,\quad x = 5\pi/6\,,\quad x = 7\pi/6$

b) $x = \pi/3,\ x = 5\pi/3,\ x = \pi$

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

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

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

$\cos(x) = 1/2$ $\quad\quad$ $x = \pi$

$x = \pi/3$

$x = 5\pi/3$

c) $x = 0$

d) $x = \pi/6,\ x = 11\pi/6,\ x = \pi$

e) $x = 0,\ x = 2\pi/3,\ x = 4\pi/3$

f) None of the above.

Question 10

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

$$4\sin^2(x) = 3$$

$4\sin^2(x) = 3$

$\sin^2(x) = \frac{3}{4}$

$\sin(x) = \frac{\pm\sqrt{3}}{\sqrt{4}}$

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

$x = \pi/3,\ 2\pi/3,\ 4\pi/3,\ 5\pi/3$

a) $x = \pi/3,\ x = 2\pi/3$

b) $x = \pi/4,\ x = 3\pi/4$

c) $x = \pi/3,\ x = 2\pi/3,\ x = 4\pi/3,\ x = 5\pi/3$

d) $x = \pi/6,\ x = 5\pi/6,\ x = 7\pi/6,\ x = 11\pi/6$

e) $x = \pi/6,\ x = 5\pi/6$

f) None of the above.

Question 11

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

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

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

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

$\cos(x) = 0$ $\quad\quad$ $\cos(x) = -1$

$x = \pi/2$ $\quad\quad$ $x = \pi$

$x = 3\pi/2$

a) $x = \pi/2,\ x = 3\pi/2$

b) $x = 0$

c) $x = \pi/4,\ x = 3\pi/4$

d) $x = \pi/2$, $x = 3\pi/2$, $x = 0$

e) $x = \pi/2$, $x = 3\pi/2$, $x = \pi$

f) None of the above.

Question 12

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

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

$\sin^2(x) + \sin(x) = 0$

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

$\sin x = 0$ $\quad$ $\sin(x) + 1 = 0$

$x = 0$, $x = \pi$ $\quad$ $\sin(x) = -1$

$x = 3\pi/2$

a) $x = 0$, $x = \pi$

b) $x = 3\pi/2$

c) $x = \pi/4$, $x = 3\pi/4$

d) $x = 0$, $x = \pi/2$, $x = \pi$

e) $x = 0$, $x = \pi$, $x = 3\pi/2$

f) None of the above.

Question 13

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$: $\csc(2x) = 2$

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

① $\sin(x) = 1/2$

$x = \pi/6$

$x = 5\pi/6$

$[\,0, 24\pi/12\,)$

$2x = \frac{\pi}{6} + 2\pi k$ $\quad$ $2x = \frac{5\pi}{6} + 2\pi k$

$x_1 = \frac{\pi}{12} + \pi k = \frac{\pi}{12} + \frac{12\pi}{12} k$

$x_2 = \frac{5\pi}{12} + \pi k = \frac{5\pi}{12} + \frac{12\pi}{12} k$

$k=0$ $\quad$ $x = \pi/12$ $\quad$ $x = 5\pi/12$

$k=1$ $\quad$ $x = 13\pi/12$ $\quad$ $x = 17\pi/12$

$k=2$ $\quad$ $x = 25\pi/12$ $\quad$ $x = 29\pi/12$

a) $x = \pi/12$, $x = 5\pi/12$, $x = 13\pi/12$, $x = 17\pi/12$

b) $x = 7\pi/12$, $x = 11\pi/12$, $x = 19\pi/12$, $x = 23\pi/12$

c) $x = \pi/4$, $x = 3\pi/4$

d) $x = \pi/6$, $x = 5\pi/6$

e) $x = \pi/12$, $x = 11\pi/12$, $x = 13\pi/12$, $x = 23\pi/12$

f) None of the above.

Question 14

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

$$\sin\left(x+\pi/4\right)=-\sqrt{2}/2$$

a) $x=\pi\,,\quad x=3\pi/2$

b) $x=5\pi/4\,,\quad x=7\pi/4$

c) $x=\pi/4\,,\quad x=3\pi/4$

d) $x=0\,,\quad x=\pi$

e) $x=\pi$

f) None of the above.

$[\frac{0}{4}, \frac{8\pi}{4})$ $\sin x = -\sqrt{2}/2 \rightarrow [0, 2\pi]$

$x = 5\pi/4 \quad x = 7\pi/4$

$x+\pi/4 = \frac{5\pi}{4}+2\pi k$

$-\pi/4 \quad -\pi/4$

$x = \frac{4\pi}{4}+2\pi k$

$x = \frac{4\pi}{4}+\frac{8\pi k}{4}$

$k=0 \quad x_1 = \frac{4\pi}{4} \checkmark = \pi$

$k=1 \quad x_1 = 12\pi/4$ X

$x+\frac{\pi}{4} = \frac{7\pi}{4}+2\pi k$

$-\pi/4 \quad -\pi/4$

$x = \frac{6\pi}{4}+2\pi k$

$x = \frac{6\pi}{4}+\frac{8\pi k}{4}$

$x_1 = \frac{6\pi}{4} = \frac{3\pi}{2}$ ✓

$x_2 = 14\pi/6$ X

Question 15

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,]$.

$$\sin\left(x/2-\pi/3\right)=1/2$$

a) $\frac{1}{2}\pi$

b) π

c) $\frac{7}{6}\pi$

d) $\frac{1}{3}\pi$

e) $\frac{4}{3}\pi$

f) None of the above.

$[\frac{0}{6}, \frac{12\pi}{6}]$ $\sin(x) = 1/2$

$x = \pi/6, 5\pi/6$

$\frac{x}{2}-\frac{\pi}{3} = \frac{\pi}{6}+2\pi k$

$+\pi/3 \quad +\pi/3$

$\frac{x}{2} = \frac{\pi}{6}+\frac{2\pi}{6}+2\pi k$

2. $\frac{x}{2} = 2\left(\frac{3\pi}{6}+2\pi k\right)$

$x = \frac{6\pi}{6}+4\pi k$

$x = \frac{6\pi}{6}+\frac{24\pi}{6}k$

$k=0 \quad x = 6\pi/6 = \pi$

$k=1 \quad x = 30\pi/6$ X

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

$+\pi/3 \quad +\pi/3$

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

2. $\frac{x}{2} = 2\left(\frac{7\pi}{6}+2\pi k\right)$

$x = \frac{14\pi}{6}+2\pi k$

$x = \frac{14\pi}{6}+\frac{12\pi k}{6}$

$x = 14\pi/6$ X

$x = 28\pi/6$ X

Question 16

Your answer is CORRECT.

Solve the following equation on the interval $[0, \pi/2]$.

$$2\sin\left(4x - \frac{1}{8}\pi\right) = -\sqrt{2}$$

$\left[\frac{0}{32}, \frac{16\pi}{32}\right]$

$\sin\left(4x - \frac{\pi}{8}\right) = \frac{-\sqrt{2}}{2}$

$\sin(x) = -\sqrt{2}/2 \rightarrow [0, 2\pi]$

$x = 5\pi/4 \quad x = 7\pi/4$

a) $\left\{x = \frac{11}{32}\pi, x = \frac{15}{32}\pi\right\}$

b) $\left\{x = \frac{3}{32}\pi, x = \frac{7}{32}\pi\right\}$

c) $\left\{x = \frac{11}{64}\pi, x = \frac{15}{64}\pi\right\}$

d) $\left\{x = \frac{7}{32}\pi, x = \frac{11}{32}\pi\right\}$

e) $\left\{x = \frac{3}{32}\pi, x = \frac{15}{32}\pi\right\}$

f) None of the above.

$4x - \frac{\pi}{8} = \frac{5\pi}{4} + 2\pi k$

$+\pi/8 \quad +\pi/8$

$4x = \frac{10\pi}{8} + \frac{\pi}{8} + 2\pi k$

$\frac{4x}{4} = \frac{11\pi}{8} + 2\pi k$

$x = \frac{11\pi}{32} + \frac{\pi}{2}k$

$x = \frac{11\pi}{32} + \frac{16\pi}{32}k$

$k = 0 \quad x_1 = \frac{11\pi}{32}$

$k = 1 \quad x_1 = \frac{27\pi}{32}$ X

$4x - \frac{\pi}{8} = \frac{7\pi}{4} + 2\pi k$

$+\pi/8 \quad +\pi/8$

$4x = \frac{14\pi}{8} + \frac{\pi}{8} + 2\pi k$

$\frac{4x}{4} = \frac{15\pi}{8} + 2\pi k$

$x = \frac{15\pi}{32} + \frac{\pi}{2}k$

$x = \frac{15\pi}{32} + \frac{16\pi}{32}k$

$x_2 = \frac{15\pi}{32}$

$x_2 = \frac{31\pi}{32}$ X

Question 17

Your answer is CORRECT.

$[\frac{0}{24}, \frac{12\pi}{24})$

Solve the following equation on the interval $[0, \pi/2)$.

$$2\cos\left(2x - \frac{1}{4}\pi\right) = \sqrt{3}$$

$\cos\left(2x - \frac{\pi}{4}\right) = \frac{\sqrt{3}}{2}$

$\cos(x) = \frac{\sqrt{3}}{2} \rightarrow [0, 2\pi]$

$x = \pi/6, \ 11\pi/6$

a) $\frac{5}{24}\pi$

b) $\frac{1}{4}\pi$

c) $\frac{1}{6}\pi$

d) $\frac{7}{24}\pi$

$2x - \frac{\pi}{4} = \frac{\pi}{6} + 2\pi k$

$+\frac{\pi}{4} \quad +\frac{\pi}{4}$

$2x = \frac{2\pi}{12} + \frac{3\pi}{12} + 2\pi k$

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

$x = \frac{5\pi}{24} + \pi k$

$x = \frac{5\pi}{24} + \frac{24\pi}{24}k$

$k = 0 \quad x = \frac{5\pi}{24}$

$k = -1 \quad x = -19\pi/24$ X

$2x - \frac{\pi}{4} = \frac{11\pi}{6} + 2\pi k$

$+\frac{\pi}{4} \quad +\frac{\pi}{4}$

$2x = \frac{22\pi}{12} + \frac{3\pi}{12} + 2\pi k$

$2x = \frac{25\pi}{12} + 2\pi k$

$x = \frac{25\pi}{24} + \pi k$

$x = \frac{25\pi}{24} + \frac{24\pi}{24}k$

$x = 25\pi/24$ X

$x = \pi/24$

e) $\left\{\frac{1}{24}\pi, \frac{5}{24}\pi\right\}$

f) None of the above.

Question 18

Your answer is CORRECT.

Solve

$$7\sin^2(x) + 14\sin(x) + 7 = 0$$

on the interval [0, 2π].

$7(\sin^2(x) + 2\sin(x) + 1) = 0$

$7(\sin x + 1)(\sin x + 1) = 0$

$\sin x + 1 = 0$

$\sin x = -1$

$x = 3\pi/2$

a) $\left\{\frac{3}{2}\pi\right\}$

b) $\left\{0, \frac{3}{2}\pi\right\}$

c) $\left\{\frac{1}{4}\pi, \frac{3}{4}\pi\right\}$

d) $\left\{\frac{1}{2}\pi\right\}$

e) $\{\pi\}$

Question 19

$\sin(x) = 1 \rightarrow [0, 2\pi]$

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

Your answer is CORRECT.

Solve

$$\sin\left(\pi x + \left(\frac{1}{3}\pi\right)\right) = 1$$

over the interval [$-1/3$, $2/3$]

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

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

$\pi x = \frac{3\pi}{6} - \frac{2\pi}{6} + 2\pi k$

$\pi x = \frac{\pi}{6} + 2\pi k$

$x = \frac{1}{6} + 2k$

$x = \frac{1}{6} + \frac{12}{6}k$

$k = 0 \quad x = \frac{1}{6}$ ✓

$k = 1 \quad x = \frac{13}{6}$ ✗

$k = -1 \quad x = -\frac{11}{6}$ ✗

$\left[\frac{-2}{6}, \frac{4}{6}\right]$

a) $\frac{1}{6}\pi$

b) $\frac{1}{3}$

c) $\frac{1}{6}$

d) $\frac{1}{4}\pi + \frac{3}{4}$

e) $\frac{5}{6}$

Question 20

Your answer is CORRECT.

Solve the following equation on the interval $[\,0\,,\,2\pi\,)$.

$$3\sin^2(x) + 2\sin(x) - 5 = 0$$

$(3\sin(x) + 5)(\sin(x) - 1) = 0$

$3\sin x + 5 = 0$

$\sin x = \frac{-5}{3} \notin [-1,1]$

$\sin x - 1 = 0$

$\sin x = 1$

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

a) $x = \pi\,,\ x = {}^{3\pi}/_{2}$

b) $x = 0$

c) $x = {}^{\pi}/_{2}$

d) $x = {}^{\pi}/_{2}\,,\ x = {}^{3\pi}/_{2}$

e) $x = {}^{3\pi}/_{2}$

f) None of the above.