Spiral Review

Find x.

1.) $\sin x = -\frac{1}{2}$

III, IV

$\frac{7\pi}{6}, \frac{11\pi}{6}$

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

II, III

$\frac{5\pi}{6}, \frac{7\pi}{6}$

3.) $\sec x = 2$

I, IV

$\frac{\pi}{3}, \frac{5\pi}{3}$

4.) $\tan x = -\frac{\sqrt{3}}{3}$

II, IV

$\frac{5\pi}{6}, \frac{11\pi}{6}$

$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

p.365 5.3 Solving Trigonometric Equations

To solve a trigonometric equation, use standard algebra techniques such as combining like terms and factoring. Goal: Isolate the trigonometric function!

Example:

$2\sin x - 1 = 0$

$+1 \quad +1$

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

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

I, II

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

Students will be able to solve trigonometric equations.

Example 1: Solve the equation.

a.) $\sqrt{2}\sin x + 1 = 0$

$-1 \quad -1$

$\frac{\sqrt{2}\sin x}{\sqrt{2}} = \frac{-1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\sin x = -\frac{\sqrt{2}}{2}$

III, IV

$x = \frac{5\pi}{4} + 2n\pi, \quad x = \frac{7\pi}{4} + 2n\pi$

b.) $\cot x + 1 = 0$

$\cot x = -1$

II, IV

$x = \frac{3\pi}{4} + n\pi \qquad x = \frac{7\pi}{4} + n\pi$

* not needed *

Students will be able to solve trigonometric equations.

c.) $3\cot^2 x - 1 = 0$

$\frac{3\cot^2 x}{3} = \frac{1}{3}$

$\sqrt{\cot^2 x} = \sqrt{\frac{1}{3}}$

$\cot x = \pm\frac{\sqrt{3}}{3}$

(+) I, III

$x = \frac{\pi}{3} + n\pi$

$x = \frac{4\pi}{3} + n\pi$ not needed

(−) II, IV

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

$x = \frac{5\pi}{3} + n\pi$

d.) $\cos x(\cos x - 1) = 0$

$\cos x = 0$ (y-axis)

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

$x = \frac{3\pi}{2}$ not needed!

$\cos x - 1 = 0$

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

$x = 0 + n\pi$

$x = \pi$ not needed!

Students will be able to solve trigonometric equations.

Example 2: Find all the solutions of the equation in the interval $[0, 2\pi]$.

a.) $3\sin x + 1 = \sin x$

$-\sin x \quad -\sin x$

$2\sin x + 1 = 0$

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

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

$x = \frac{7\pi}{6}, \frac{11\pi}{6}$

b.) $\tan^2 x - 1 = 0$

$\tan^2 x = 1$

$\tan x = \pm 1$

$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

Students will be able to solve trigonometric equations.

c.) $\sec x \csc x = 2\csc x$

$-2\csc x \quad -2\csc x$

$\sec x \csc x - 2\csc x = 0$

$\csc x(\sec x - 2) = 0$

$\csc x = 0$ | $\sec x - 2 = 0$

no solution | $\sec x = 2$

$x = \frac{\pi}{3}, \frac{5\pi}{3}$

d.) $\sec x + \tan x = 1$

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

$\frac{1}{\cos x}(1 + \sin x) = 1$

$\frac{1}{\cos x} = 1$ | $1 + \sin x = 1$

$\sec x = 1$ | $\sin x = 0$

$x = 0$ | $x = 0, \pi$

Turn-in:
p.373 (42, 48)

HW:
p.373 (29-47 odds)