

# Chapter 6, Trigonometric Equations

## Focus Exercise Odd Answers

### Sec. 6.1 Solving Trigonometric Equations

1.  $q = 30^\circ, 330^\circ$
3.  $x = \frac{2\pi}{3}, \frac{5\pi}{3}$
5.  $\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$
7.  $\theta = 30^\circ, 150^\circ, 210^\circ, 330^\circ$
9.  $x = 0, \pi, \frac{\pi}{4}, \frac{5\pi}{4}$
11.  $x = 0, \pi, \frac{7\pi}{6}, \frac{11\pi}{6}$
13.  $\left. \begin{array}{l} x = \frac{2\pi}{3} + 2\pi k \\ x = \frac{4\pi}{3} + 2\pi k \end{array} \right\} k \in \mathbf{Z}$
15.  $\left. \begin{array}{l} \theta = 135^\circ + 360^\circ k \\ \theta = 315^\circ + 360^\circ k \end{array} \right\} k \in \mathbf{Z}$   
or ...  $\theta = 135^\circ + 180^\circ k$

### Sec. 6.2 More Techniques for Solving Trigonometric Equations

1.  $x = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$
3.  $\theta = 0^\circ, 180^\circ, 270^\circ$
5.  $\theta = 90^\circ + 180^\circ k, k \in \mathbf{Z}$
7.  $\left. \begin{array}{l} x = \frac{\pi}{2} + \pi k \\ x = \frac{7\pi}{6} + 2\pi k \\ x = \frac{11\pi}{6} + 2\pi k \end{array} \right\} k \in \mathbf{Z}$
9.  $x = 0, \pi, \frac{2\pi}{3}, \frac{5\pi}{3}$
11. *No Solution as written.\**

**\*Note:** The author made a couple of errors in writing #11 and #12. He used a plus sign when he meant to use a minus sign. Here are #11 and 12 as they were intended to be. The answer to #11 is at the end of this answer sheet, after Sec. 6.4 answers:

Solve for  $x$ ,  $0 \leq x < 2\pi$

11.  $3\tan x - \cot x = 0$

12.  $\sin(2x) - \tan x = 0.$

**Another Note:** For #13-15, the author did not write a solving interval; however, because the equations use the variable  $x$ , the solving interval is, by default, in terms of radians:  $0 \leq x < 2\pi$ .

13.  $x = 0, \frac{2\pi}{3}$  (Note:  $\frac{4\pi}{3}$  is extraneous)

15.  $x = \frac{\pi}{4}$  (Note: Depending on how you solved the equation, either  $\frac{3\pi}{4}$  or  $\frac{5\pi}{4}$  is extraneous)

### Sec. 6.3 Altered Arguments

1.  $\theta = 20^\circ, 200^\circ$

3.  $\theta = 170^\circ, 350^\circ$

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

7.  $x = \frac{7\pi}{8}, \frac{15\pi}{8}$

9.  $\theta = 60^\circ, 180^\circ, 300^\circ$

11.  $\theta = 15^\circ, 105^\circ, 195^\circ, 285^\circ$

**Note:** For #13-16, because the equations use the variable  $x$ , the solving interval should be in terms of radians:  $0 \leq x < 2\pi$ .  
The author accidentally wrote the solving interval in terms of degrees.

13.  $x = \frac{\pi}{4}, \frac{5\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{19\pi}{12}, \frac{21\pi}{12}$

15.  $x = 0, \frac{\pi}{4}, \frac{\pi}{2}, \frac{3\pi}{4}, \pi, \frac{5\pi}{4}, \frac{3\pi}{2}, \frac{7\pi}{4}$

### Sec. 6.4 Trigonometric Equations of Multiple Angle Measures

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

3.  $x = \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

5.  $\theta = 0^\circ, 60^\circ, 120^\circ, 180^\circ, 240^\circ, 300^\circ$

7.  $\theta = 90^\circ, 270^\circ$

9. 
$$\left. \begin{array}{l} \theta = 10^\circ + 60^\circ k \\ \theta = 50^\circ + 60^\circ k \end{array} \right\} k \in \mathbf{Z}$$

11.  $x = \frac{\pi}{4} + \frac{\pi}{2}k, k \in \mathbf{Z}$

**Answers to Sec. 6.2, corrected #11 and 12 (see above on page 1 of this answer sheet):**

11.  $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

12.  $x = 0, \pi, \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$