Sec. 5.5 MORE Solving Trigonometric Equations Worksheet #3

Directions: Solve.

a) Principal solutions $[0,\ 2\pi)$

b) General solutions. All solutions in radians.

1. $\sqrt{2}\sin x+1=0$
2. $\sqrt{3}\sec x-2=0$
3. $4\cos^2 x-1=0$
4. $2\sin^2 x+3\sin x+1=0$
5. $\cot x+1=0$
6. $3\sec^2 x+\tan^2 x-3=0$
7. $3\csc^2 x-4=0$
8. $3\tan^4 x-10\tan^2 x+3=0$
9. $2\sec^3 x-\sec^2 x+2\sec x-1=0$
10. $4\sin^2 x=4\cos x+1$
11. $\cot^2 x=\csc x-1$
12. $2\cot^2 x=-1-\csc x$
13. $\cos\frac{x}{4}=0$
14. $\sin 4x=1$
15. $\sin x=\cos x$
16. $\sin 2x=-\frac{\sqrt{3}}{2}$
17. $2\sin^2 2x=1$
18. $\tan 3x(\tan x-1)=0$
19. $3\tan^3 x=\tan x$
20. $\cos\left(\frac{x}{2}\right)=\frac{\sqrt{2}}{2}$
21. $\cos x+\sin x\tan x=1$
22. $\sin\left(\frac{x}{2}\right)=0$
23. $\cos 2x=-1$
24. $\cos^2 x=\cos x$
25. $\sec 4x=2$
26. $\tan^2 3x=3$
27. $2\sin x+\csc x=0$
28. $\cos 2x(2\cos x+1)=0$
29. $\tan\left(\frac{x}{3}\right)=1$
30. $\sec x+\tan x=1$, Hint: Square both sides…but check for extraneous solutions!

Answers

1. $\boldsymbol{a)x=\frac{5\pi}{4},\frac{7\pi}{4}}$
   $\boldsymbol{b)x=\frac{5\pi}{4}+2\pi n,\frac{7\pi}{4}+2\pi n;n\in Z}$

2. $a)x=\frac{\pi}{6},\frac{11\pi}{6}$
   $b)x=\frac{\pi}{6}+2\pi n,\frac{11\pi}{6}+2\pi n,n\in Z$

3. $\boldsymbol{a)x=\frac{\pi}{3},\frac{2\pi}{3},\frac{4\pi}{3},\frac{5\pi}{3}}$
   $\boldsymbol{b)x=\frac{\pi}{3}+\pi n,\frac{2\pi}{3}+\pi n,n\in Z}$

4. $a)x=\frac{7\pi}{6},\frac{11\pi}{6},\frac{3\pi}{2}$
   $b)x=\frac{7\pi}{6}+2\pi n,\frac{11\pi}{6}+2\pi n,\frac{3\pi}{2}+2\pi n,n\in Z$

5. $a)x=\frac{3\pi}{4},\frac{7\pi}{4}$
   $b)x=\frac{3\pi}{4}+\pi n,n\in Z$

6. $a)x=0,\pi$
   $b)x=\pi n,n\in Z$

7. $\boldsymbol{a)x=\frac{\pi}{3},\frac{2\pi}{3},\frac{4\pi}{3},\frac{5\pi}{3}}$
   $\boldsymbol{b)x=\frac{\pi}{3}+\pi n,\frac{2\pi}{3}+\pi n,n\in Z}$

8. $a)x=\frac{\pi}{6},\frac{\pi}{3},\frac{2\pi}{3},\frac{5\pi}{6},\frac{7\pi}{6},\frac{4\pi}{3},\frac{5\pi}{3},\frac{11\pi}{6}$
   $b)x=\frac{\pi}{6}+\pi n,\frac{\pi}{3}+\pi n,\frac{5\pi}{6}+\pi n,\frac{2\pi}{3}+\pi n,n\in Z$

9. **a) No solution**
   b) No solution

10. $a)x=\frac{\pi}{3},\frac{5\pi}{3}$
    $b)x=\frac{\pi}{3}+2\pi n,\frac{5\pi}{3}+2\pi n,n\in Z$

11. $a)x=\frac{\pi}{2}$
    $b)x=\frac{\pi}{2}+2\pi n,n\in Z$

12. $a)x=\frac{3\pi}{2}$
    $b)x=\frac{3\pi}{2}+2\pi n,n\in Z$

13. $a)$no solution on $[0,2\pi)$
    $b)x=2\pi+4\pi n,n\in Z$

14. $a)x=\frac{\pi}{8},\frac{5\pi}{8},\frac{9\pi}{8},\frac{13\pi}{8}$
    $b)x=\frac{\pi}{8}+\frac{\pi}{2}n,\ n\in Z$

15. $a)x=\frac{\pi}{4},\frac{5\pi}{4}$
    $b)x=\frac{\pi}{4}+\pi n,n\in Z$

16. $a)x=\frac{2\pi}{3},\frac{5\pi}{6},\frac{5\pi}{3},\frac{11\pi}{6}$
    $b)x=\frac{2\pi}{3}+\pi n,\frac{5\pi}{6}+\pi n,n\in Z$

17. $a)x=\frac{\pi}{8},\frac{3\pi}{8},\frac{5\pi}{8},\frac{7\pi}{8},\frac{9\pi}{8},\frac{11\pi}{8},\frac{13\pi}{8},\frac{15\pi}{8}$
    $b)x=\frac{\pi}{8}+\frac{\pi}{4}n,n\in Z$

18. $a) x = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{4}, \frac{5\pi}{4}$

$b) x = \frac{\pi}{3}n, \frac{\pi}{4} + \pi n, n \in Z$

19. $a) x = 0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

$b) x = \pi n, \frac{\pi}{6} + \pi n, \frac{5\pi}{6} + \pi n, n \in Z$

20. $a) x = \frac{\pi}{2}$

$b) x = \frac{\pi}{2} + 4\pi n, \frac{7\pi}{2} + 4\pi n; n \in Z$

21. $a) x = 0$

$b) x = 2\pi n, n \in Z$

22. $a) x = 0$

$b) x = 2\pi n, n \in Z$

23. $a) x = \frac{\pi}{2}, \frac{3\pi}{2}$

$b) x = \frac{\pi}{2} + \pi n, n \in Z$

24. $a) x = 0, \frac{\pi}{2}, \frac{3\pi}{2}$

$b) x = 2\pi n, \frac{\pi}{2} + \pi n, n \in Z$

25. $a) x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

$b) x = \frac{\pi}{12} + \frac{\pi}{2}n, \frac{5\pi}{12} + \frac{\pi}{2}n, n \in Z$

26. $a) x = \frac{\pi}{9}, \frac{2\pi}{9}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{7\pi}{9}, \frac{8\pi}{9}, \frac{10\pi}{9}, \frac{11\pi}{9}, \frac{13\pi}{9}, \frac{14\pi}{9}, \frac{16\pi}{9}, \frac{17\pi}{9}$

$b) x = \frac{\pi}{9} + \frac{\pi}{3}n, \frac{2\pi}{9} + \frac{\pi}{3}n, \ n \in Z$

27. No Solution

28. $a) x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}, \frac{2\pi}{3}, \frac{4\pi}{3}$

$b) x = \frac{\pi}{4} + \frac{\pi}{2}n, \frac{2\pi}{3} + 2\pi n, \frac{4\pi}{3} + 2\pi n, n \in Z$

29. $a) x = \frac{3\pi}{4}$

$b) x = \frac{3\pi}{4} + 3\pi n, n \in Z$

30. $a) x = 0$

$b) x = 2\pi n, n \in Z$