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Assignment: 6.5 Trigonometric
 Equations I and II

1. Complete the following.

The equation $\sin x = \frac{1}{2}$ has _____ solution(s) in $[0, 2\pi)$.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** The number of solutions is . (Type a whole number.)
☐ **B.** There are no solutions.

2. Fill in the blanks.

All solutions of $\sin x = \frac{1}{2}$ are given by _____ and _____, for any integer n .

All solutions of $\sin x = \frac{1}{2}$ are given by $\frac{\pi}{6} + 2n\pi$ and $\frac{5\pi}{6} + 2n\pi$, for any integer n .

3. Complete the following.

The equation $\cos x = 1$ has _____ solution(s) in $[0, 2\pi)$.

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** The number of solutions is . (Type a whole number.)
☐ **B.** There are no solutions.

4. Fill in the blank.

All solutions of $\tan x = -1$ are given by _____ for any integer n .

All solutions of $\tan x = -1$ are given by $-\frac{\pi}{4} + n\pi$, for any integer n .

5. Find all solutions of the equation. Express the solutions in radians.

$$\tan x = 1$$

$x = \frac{\pi}{4} + n\pi$, where n is any integer.

(Type an exact answer, using π as needed. Use angle measures greater than or equal to 0 and less than π . Use integers or fractions for any numbers in the expression.)

6. Find all solutions of the equation. Express the solutions in radians between 0 and 2π .

$$\cos x = \frac{\sqrt{2}}{2}$$

$x = \frac{\pi}{4} + 2n\pi$ or $x = \frac{7\pi}{4} + 2n\pi$, where n is any integer.

(Type an exact answer, using π as needed. Use ascending order. Use integers or fractions for any numbers in the expression.)

7. Find all solutions of the equation. Express the solutions in radians between 0 and 2π .

$$\sin x = -\frac{\sqrt{3}}{2}$$

$x = \frac{4\pi}{3} + 2n\pi$ or $x = \frac{5\pi}{3} + 2n\pi$, where n is any integer.

(Type an exact answer, using π as needed. Use ascending order. Use integers or fractions for any numbers in the expression.)

8. Find all solutions of the equation in the interval $[0^\circ, 360^\circ)$. Round your answers to the nearest tenth of a degree.

$$\cos \theta = 0.3$$

$$x \approx \{ 72.5, 287.5 \}$$

(Use a comma to separate answers as needed. Round the final answer to the nearest tenth as needed. Round all intermediate values to the nearest tenth as needed.)

9. Use a calculator to solve the equation on the interval $0 \leq \theta < 2\pi$.

$$5 \tan \theta + 7 = 0$$

What are the solutions in the interval $0 \leq \theta < 2\pi$? Select the correct choice and fill in any answer boxes in your choice below.

- ☒ **A.** The solution set is $\{ 2.19, 5.33 \}$.
(Type your answer in radians. Do not round until the final answer. Then round to two decimal places as needed. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

10. Find all solutions of the equation in the interval $[0, 2\pi)$.

$$\sin \left(x + \frac{\pi}{2} \right) = \frac{\sqrt{3}}{2}$$

$$\text{The solution set is } \left\{ \frac{11\pi}{6}, \frac{\pi}{6} \right\}$$

(Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

11. Find all solutions of the equation in the interval $[0, 2\pi)$.

$$\sqrt{3} \tan \left(x - \frac{\pi}{9} \right) - 1 = 0$$

$$x = \left\{ \frac{5\pi}{18}, \frac{23\pi}{18} \right\}$$

(Use a comma to separate answers as needed. Type an exact answer, using π as needed.)

12. Solve the equation on the interval $0 \leq \theta < 2\pi$.

$$(\cot \theta - 1)(\csc \theta - 1) = 0$$

Select the correct choice below and fill in any answer boxes in your choice.

- ☒ **A.** The solution set is $\left\{ \frac{\pi}{4}, \frac{5\pi}{4}, \frac{\pi}{2} \right\}$.
(Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution on this interval.

13. Find all solutions of the equation in the interval $[0, 2\pi)$.

$$(\tan x - 1)(2 \sin x - \sqrt{3}) = 0$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☒ **A.** $x = \left\{ \frac{\pi}{4}, \frac{5\pi}{4}, \frac{\pi}{3}, \frac{2\pi}{3} \right\}$
(Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

14. Find all solutions of the equation in the interval $[0, 2\pi)$.

$$4 \sin^2 \theta = 2$$

Select the correct choice and fill in any answer boxes in your choice below.

- ☒ **A.** $\theta = \left\{ \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4} \right\}$
 (Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

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

$$16 \cos^2 x = 4$$

$$x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

(Type an exact answer, using π as needed. Use a comma to separate answers as needed. Use integers or fractions for any numbers in the expression.)

16. Solve the equation.

$$2 \sin^2 \theta - \sin \theta - 1 = 0$$

What is the solution in the interval $0 \leq \theta < 2\pi$? Select the correct choice and fill in any answer boxes in your choice below.

- ☒ **A.** The solution set is $\left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2} \right\}$.
 (Simplify your answer. Type an exact answer, using π as needed. Type your answer in radians. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

17. Use trigonometric identities to solve the equation in the interval $[0, 2\pi)$.

$$\cos^2 x - 3 \sin^2 x = 1$$

Select the correct choice and fill in any answer boxes in your choice below.

- ☒ **A.** $x = \left\{ 0, \pi \right\}$
 (Type your answer in radians. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

18. Use trigonometric identities to solve the equation in the interval $[0, 2\pi)$.

$$2 \cos^2 \theta - 3 \sin \theta - 3 = 0$$

Select the correct choice and fill in any answer boxes in your choice below.

- ☒ **A.** $\theta = \left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2} \right\}$
 (Type your answer in radians. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- ☐ **B.** There is no solution.

19. Solve each trigonometric equation in the interval $[0, 2\pi)$ by first squaring both sides.

$$\sqrt{3} \sin x = \cos x + 1$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.



A.

The solution set is $\left\{ \frac{\pi}{3}, \pi \right\}$.

(Simplify your answer. Use a comma to separate answers as needed. Type an exact answer, using π as needed. Use integers or fractions for any numbers in the expression.)



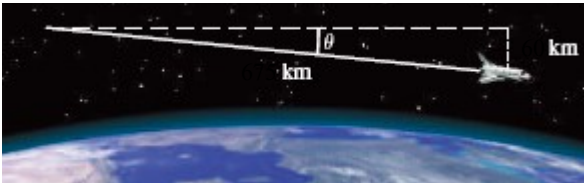
B.

There is no solution on this interval.

20. A tower that is 122 feet tall casts a shadow 163 feet long. Find the angle of elevation of the sun to the nearest degree.

The angle of elevation is degrees. (Round to the nearest degree.)

21. When a spacecraft reenters the atmosphere, the angle of reentry off the horizontal must be between 5.1° and 7.1° . Under 5.1° , the spacecraft would "skip" back into space, and over 7.1° , the acceleration forces would be too high and the spacecraft would crash. On reentry, a spacecraft descends 60 kilometers vertically while traveling 675 kilometers. Find the angle of reentry off the horizontal to the nearest tenth of a degree.



The angle of reentry off the horizontal to the nearest tenth of a degree of the spacecraft is approximately $^\circ$.

22. Solve the following equation.

$$x = \cos^{-1}\left(\frac{1}{2}\right)$$

The solution set is $\left\{ \frac{\pi}{3} \right\}$. (Type an exact answer in terms of π .)

23. Solve the following equation.

$$x = \tan^{-1}(\sqrt{3})$$

The solution set is $\left\{ \frac{\pi}{3} \right\}$. (Type an exact answer in terms of π .)

24. Watch the video and then solve the problem given below.

[Click here to watch the video.](#)¹

Find all solutions of $\csc x = -2.4$ in the interval $[0, 2\pi)$, rounded to two decimal places.

$x =$

(Round to two decimal places as needed. Use a comma to separate answers as needed. Type your answer in radians.)

1: http://mediaplayer.pearsoncmg.com/assets/e57pBpH_n9IB1DsJfrq9X9Pcrb2At_o2?clip=2

25. Watch the video and then solve the problem given below.

[Click here to watch the video.](#)²

Find all solutions to the equation $\sin(2x) = \frac{\sqrt{2}}{2}$, in the interval $[0, 2\pi)$.

$x = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{9\pi}{8}, \frac{11\pi}{8}$

(Use a comma to separate answers as needed. Type your answer in radians. Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression.)

2: http://mediaplayer.pearsoncmg.com/assets/e57pBpH_n9IB1DsJfrq9X9Pcrb2At_o2?clip=4

26. Watch the video and then solve the problem given below.

[Click here to watch the video.](#)³

Find all solutions of the equation $2 \cos^2 \theta + 9 \cos \theta - 5 = 0$, in the interval $[0, 2\pi)$.

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

(Use a comma to separate answers as needed. Type your answer in radians. Type an exact answer in terms of π . Use integers or fractions for any numbers in the expression.)

3: http://mediaplayer.pearsoncmg.com/assets/e57pBpH_n9lB1DsJfrq9X9Pcrb2At_o2?clip=7
