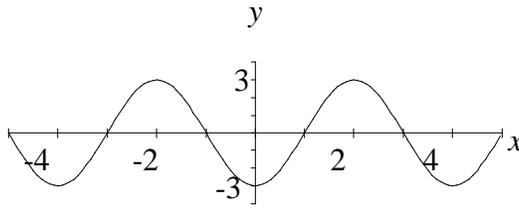
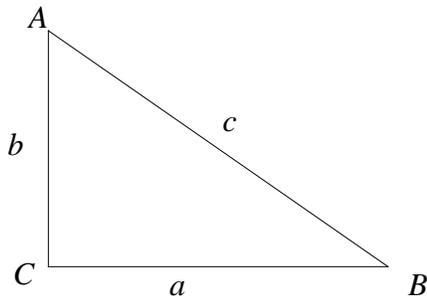


- 1) Find an equation of the graph below in the form $y = a \sin(bx + c)$ for $a > 0$, $b > 0$ and the least positive real number c .



- A. $y = 3 \sin \frac{1}{2} x - \frac{3}{2}$
- B. $y = 3 \sin \frac{1}{2} x + \frac{3}{2}$
- C. $y = 3 \sin \frac{1}{2} x - \frac{3}{2}$
- D. $y = 3 \sin \frac{1}{2} x + \frac{3}{2}$
- E. None of these.

2. Given $\triangle ABC$, with $\angle C = 90^\circ$, express b in terms of c and a .



- A. $b = a \tan$
- B. $b = a \cos$
- C. $b = \frac{a}{\cos}$
- D. $b = \frac{a}{\sin}$
- E. None of these.

3. From the top of a building that is 90 feet tall, the angle of elevation of the top of a nearby building is 32° and the angle of depression of the base of the same building is 17° . Approximate the height of the nearby building to the nearest foot.

- A. 184 feet
- B. 134 feet
- C. 364 feet
- D. 274 feet
- E. None of these.

For problems 4 and 5:

An airplane, flying at a speed of 300 miles per hour, flies from point A in the direction 70° for 2.5 hours and then flies in the direction 160° for 2 hours.

4. In what direction, to the nearest degree, does the plane now have to fly in order to get back to point A?

- A. 316°
- B. 289°
- C. 230°
- D. 301°
- E. None of these.

5. Assuming the speed of the plane does not change, how long will it take to get back to point A? Round your answer to the nearest tenth of an hour.

- A. 1.5 hours
- B. 4.5 hours
- C. 2.4 hours
- D. 3.2 hours
- E. None of these.

6. $\frac{1}{\sec x - \tan x}$ is equivalent to which of the following?

A. $\frac{\cos x}{1 - \sin x}$

B. $\frac{\sin x - \cos x}{\sin x \cos x}$

C. $\frac{\sin x \cos x}{\sin x - \cos x}$

D. $\frac{\sin x \cos x}{\cos x - \sin^2 x}$

E. $\frac{\sin x \cos x}{1 - \sin x}$

7. $\frac{\sec^2 x - \tan^2 x + \tan x}{\sec x}$ is equivalent to which of the following?

A. $\frac{\cos^2 x}{\cos x + \sin x}$

B. $\frac{(2 \tan x - 1)(\tan x + 1)}{\cos x}$

C. $\cos x(2 \tan x - 1)(\tan x + 1)$

D. $\frac{\cos x + \sin x}{\cos^2 x}$

E. $\cos x + \sin x$

8. Find all solutions of the equation $\tan(3x) = -\sqrt{3}$.

- A. $x = \frac{5}{6} + n$
- B. $x = \frac{2}{9} + \frac{1}{3}n$
- C. $x = \frac{5}{18} + \frac{1}{3}n$
- D. $x = \frac{2}{3} + n$
- E. None of these.

9. Find all solutions of the equation $2\sin^2 x + 3\sin x + 1 = 0$ that are in the interval $[0, 2\pi)$.

- A. $\frac{5}{6}, \frac{5}{6}, \frac{7}{6}$
- B. $\frac{4}{3}, \frac{5}{3}, \frac{3}{2}$
- C. $\frac{7}{6}, \frac{11}{6}, \frac{3}{2}$
- D. $\frac{2}{3}, \frac{2}{3}, \frac{7}{6}$
- E. None of these.

10. Find all the solutions of the equation $\cos^2 \theta + \cos \theta - 12 = 0$ that are in the interval $[0, 2\pi)$.

A. $-\frac{\pi}{4}, -\frac{\pi}{3}$

B. $\frac{3\pi}{4}, \frac{2\pi}{3}$

C. $-\pi, 3$

D. $4, -3$

E. No solution.

11. Which of the following is a cofunction of the complementary angle of $\sin 50^\circ 12'$?

A. $\cos 39^\circ 48'$

B. $\tan 129^\circ 48'$

C. $\sec 39^\circ 48'$

D. $\csc 129^\circ 48'$

E. None of these.

12. If $\cos \theta = \frac{12}{13}$ and $\tan \phi = -\frac{4}{3}$ for a fourth-quadrant angle θ and a second-quadrant angle ϕ , find the exact value of $\sin(\theta + \phi)$.

A. $-\frac{33}{65}$

B. $\frac{63}{65}$

C. $-\frac{63}{65}$

D. $\frac{33}{65}$

E. None of these.

13. If α and β are acute angles such that $\cot \alpha = \frac{3}{4}$ and $\csc \beta = \frac{25}{24}$, find the exact value of $\tan(\alpha - \beta)$.

A. $-\frac{3}{4}$

B. $\frac{44}{117}$

C. $-\frac{44}{117}$

D. $\frac{3}{4}$

E. None of these.

14. $\cos \alpha + \frac{5}{4}$ is equivalent to which of the following?

A. $\frac{\sqrt{2}}{2}$

B. $\frac{\sqrt{2}(\sin \alpha + \cos \alpha)}{2}$

C. $\frac{\sqrt{2}(\cos \alpha - \sin \alpha)}{2}$

D. $\frac{\sqrt{2}}{2} +$

E. $\frac{\sqrt{2}(\sin \alpha - \cos \alpha)}{2}$