

## Trigonometry (Open)

*Except for problem #9, answers must be simplified and exact (i.e., they may contain  $\pi$ , radicals, fractions, terminating or repeating decimals, but they may not contain decimal approximations). Radicals must be expressed in simplest radical form, and fractions must be expressed in lowest terms. Final answers may not contain negative exponents or fractional exponents. If there are multiple solutions, separate them by a comma.*

1. \_\_\_\_\_ Find the radian measure of an angle that has degree measure  $210^\circ$ .
2. \_\_\_\_\_ Simplify completely:  $\sin x \tan x + \cos x$
3. \_\_\_\_\_ Find the solution(s) for  $2 \cos x = \sqrt{3}$  in the interval  $[-2\pi, 2\pi]$ . Express your answer(s) in radian measure.
4. \_\_\_\_\_ Find the exact value of  $\cos 105^\circ$ .
5. \_\_\_\_\_ If  $\sin \theta = \frac{1}{2}$  and  $\theta$  terminates in Quadrant II, find the exact value of  $\cos \theta$ .
6. \_\_\_\_\_ Use DeMoivre's Theorem to find  $(1 + i)^6$ .
7. \_\_\_\_\_ Find the period for the graph of  $y = 3 \cot\left(5x + \frac{\pi}{2}\right) - 1$
8. \_\_\_\_\_ Write  $\sin(\tan^{-1} x)$  as an equivalent expression in  $x$  only.
9. \_\_\_\_\_  $\triangle ABC$  has side  $BC = 54$  ft, side  $AC = 62$  ft, and  $m\angle A = 40^\circ$ . Find the degree measure(s) of  $\angle B$ . Round your answer(s) to the nearest degree.
10. \_\_\_\_\_ Find all the solutions (in radians) for  $4 \sin^2 \frac{x}{5} = 3$  in the interval  $[-5\pi, 5\pi]$ .
11. \_\_\_\_\_ Find the phase shift for the graph of  $y = -5 \csc\left(4x - \frac{3\pi}{2}\right) + 7$ .
12. \_\_\_\_\_ If  $\tan \alpha = \frac{4}{3}$ , where  $180^\circ < \alpha < 270^\circ$ , find the exact value of  $\sin \frac{\alpha}{2}$ .
13. \_\_\_\_\_ Two sides of a triangle have lengths 20 m and 30 m. If the included angle between these two sides has a measure of  $60^\circ$ , find the exact value for the length of the third side.
14. \_\_\_\_\_ Find the  $x$ -intercept(s) for  $y = 2 \cot(3x - \pi)$  in the interval  $[0, \pi]$ . Express the answer(s) as ordered pair(s).
15. \_\_\_\_\_ Find the amplitude for the graph of  $y = -\frac{2}{7} \sin(4x + \pi) - \frac{3}{5}$ .
16. \_\_\_\_\_ The rectangular coordinates of a point are  $(-2\sqrt{3}, 2)$ . Find the polar coordinates of the point. Express the angle in radians.