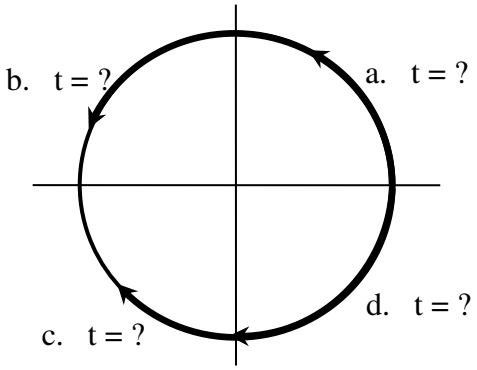
Trigonometry
Practice Final Review

1. Select the appropriate arc that describes *t*, the direction and length of the arc on the unit circle.

$$\left\{\frac{\pi}{6},\frac{\pi}{3},\pi,\frac{3\pi}{2},\frac{3\pi}{4},\frac{5\pi}{6},\frac{5\pi}{4},\frac{-\pi}{4},-\frac{\pi}{2},-\frac{3\pi}{4},-\frac{7\pi}{6}\right\}$$

a. _____



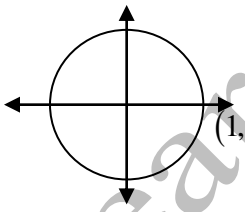
b. _____

c. _____

d. _____

For each expression sketch the given arc and state the reference arc. Then find exact functional value.

2.

	Sketch Arc	Reference Arc	Functional Value
$\tan\frac{5\pi}{3}$		$x =$ _____	$\tan\frac{5\pi}{3} =$ _____

3. If $\tan\alpha = \frac{2}{5}$ and $\pi < \alpha < \frac{3\pi}{2}$, find the following exact functional values:

a. $\sin\alpha$ _____

b. $\cos\alpha$ _____

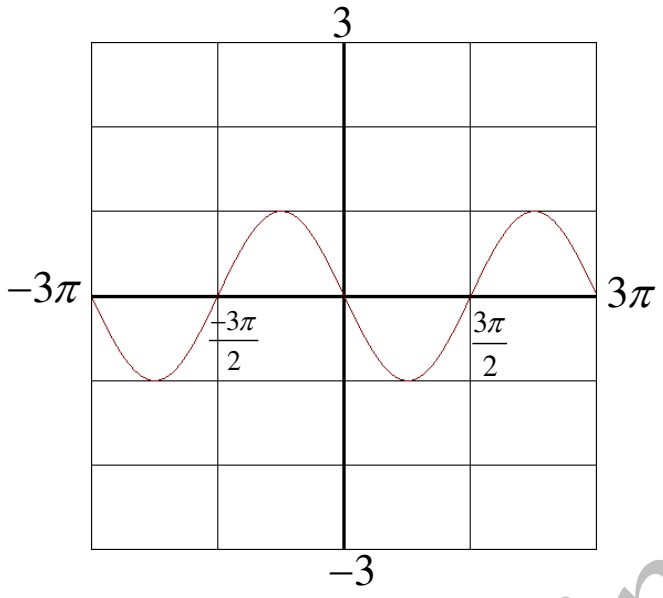
c. $\csc\alpha$ _____

d. $\sec\alpha$ _____

e. $\cot\alpha$ _____

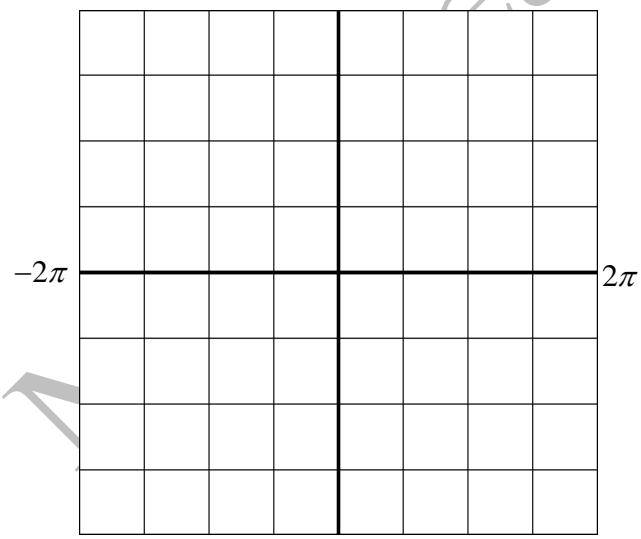
Find four equations in the form $y = A\sin\left[B\left(x-C\right)\right]$ and $y = A\cos\left[B\left(x-C\right)\right]$ for A > 0, B > 0, and $-3\pi < C < 3\pi$ that represents the given periodic graph.

4.

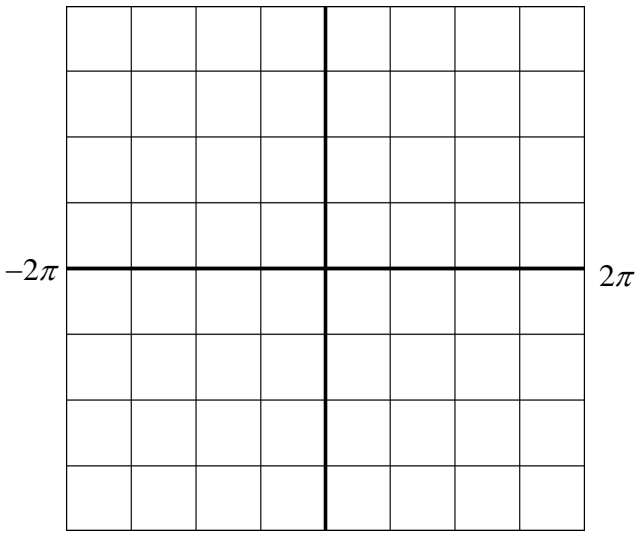


Sketch the function between -2π and 2π. Indicate asymptotes and x – intercepts (if applicable).

5. $y = -\tan\left(x+\frac{\pi}{4}\right)$



6. $y = 2\sin 2\left(x-\frac{\pi}{2}\right)$



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7. A phonograph record is turning at 45 rpm (revolutions per minute). If the distance from the center of the record to a point on the edge of the record is 3 inches, find the angular velocity and the linear velocity of the point in feet per minute.

_____

_____

8. If the diameter of a Ferris wheel is 250 feet and one complete revolution takes 20 minutes, find the linear velocity of a person riding on the wheel in miles per hour.

_____

9. A mixing blade on a food processor extends out 3 inches from its center. If the blade is turning at 600 rpm, what is the linear velocity of the tip of the blade in feet per minute?

_____

Solve the triangle.

10. $\alpha = 142°,\ b = 2.9\,cm, a = 1.4\,cm$

$c =$ _____

$\beta =$ _____

$\gamma =$ _____

11. $\gamma = 27°50',\ c = 34.7m,\ b = 42.5\,m$

$a =$ _____

$\alpha =$ _____

$\beta =$ _____

Prove that the equation is an identity.

12. $\dfrac{\sin\theta + \tan\theta}{1 + \cos\theta} = \tan\theta$

13. $\sec^2 x \csc^2 x = \sec^2 x + \csc^2 x$

Find the exact functional value.

14. Using the Sum Identity.

Find $\cos 75°$

15. Use the Difference Identity.

Find $\sin \frac{2\pi}{3}$

State the double-angle identities for

16. $\cos 2x$

Use the half-angle identities to find the exact value of each expression.

17. $\tan 120°$

18. $\cos \frac{5\pi}{6}$

Solve the equation for exact values of x when $a) 0 \le x \le 2\pi \quad b) x \in \Re$

19. $\csc x = \frac{2\sqrt{3}}{3}$

20. $\sec x = \sqrt{\frac{16}{12}}$

Find exact solutions whenever possible for $0° \le x < 360°$. Otherwise approximate the solutions to the nearest tenth of a degree.

21. $2\sin^2 t = 1$

22. $4\cos^2 t + 19\cos t = 5$

23. $5\sec^2 t + 3(5 - \sec t) = 18$

24. $5\tan^2 t = 8(5 - 2\tan t)$

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Solve the following equation for (a) all values and (b) the fundamental values $(0 \le x < 2\pi)$. Do not use a calculator. Leave your answers in radians and express them as rational functions of π.

25. $\tan^2\left(4x+\frac{\pi}{2}\right)-1=0$

26. $\csc^2\left(2x+\frac{\pi}{3}\right)-4=0$

Solve the system of equations for exact values of *x*, where $0° \le x < 360°$.

27. $\begin{cases} y = 2\cos^2\frac{x}{2}-1 \\ y = \frac{1+\cos 2x}{2} \end{cases}$

28. $\begin{cases} y = \cos 6x \cos 4x \\ y = \frac{1}{\sqrt{2}} - \sin 6x \sin 4x \end{cases}$

29. Let $\tan A = -\frac{5}{12}$ and $\cos B = -\frac{3}{5}$, where *A is* in QII and *B* is in QIII. Find the exact value of:

a) $\cos(A+B)$

b) $\cos(A-B)$

Find two different sets of parametric equations for the given rectangular equation.

30. $x^2-3y-9=0$

31. $2x+5y=3$

Use DeMoivre's Theorem and write the answer in standard form, $a+bi$.

32. $\left(-2\sqrt{3}-2i\right)^{-5}$

33. $\left[5\left(\cos 120° + i\sin 120°\right)\right]^3$

Solve the equation for x, where x is a complex number. Leave the results in $a+bi$ form.

34. $x^4+1=0$

35. $x^3+64=0$

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36. Kirk Clark Cleaning Service uses a 30-foot ladder to clean the windows of a building. If the base of the ladder is 25 feet from the building, what angle (in degrees) does the ladder make with the ground and how far up the window is the top of the ladder? Approximate your solution to 2 decimal places.

37. A tourist boat is traveling from Key West to Naples, Florida, which is approximately 130 miles away. After traveling for 50 miles, the captain notices that he is $30°$ off course due to heavy winds. At that point, determine how far the tourist boat is from Naples and the angle the boat should turn to correct its course.

_____

38. Julie hiked 25 miles N $37°$ E and then hiked 13 miles N $19°$ W. How far was she from her starting position and in which direction must she hike to get back?

_____

_____

39. Find the exact value of y. Leave your answer in radians.

a. $y = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ b. $y = \arctan\left(-\sqrt{3}\right)$

40. Convert the following units.

a. $-\frac{\pi}{30}$ to degrees. b. $160°$ to radians.

41. If $\sin\theta = -\frac{\sqrt{3}}{2}$ and $\pi < \theta < \frac{3\pi}{2}$, find the following exact functional values:

$\cos\theta =$ _____ $\tan\theta =$ _____

$\csc\theta =$ _____ $\sec\theta =$ _____ $\cot\theta =$ _____

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