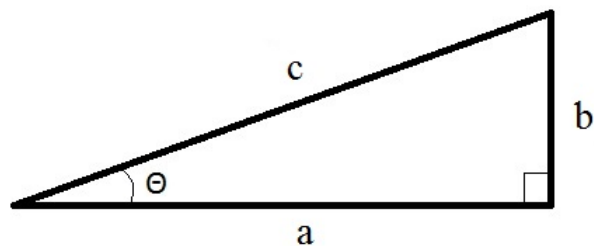


Math 129: Pre-Calculus
Fall 2025
Practice Problems for Trig Exam

Name (Print): _____

1. Convert the angle 160° to radians.
2. Convert the angle $\frac{\pi}{18}$ to degrees.
3. Find an angle between 0 and 2π that is coterminal to $-\frac{19\pi}{7}$.
4. Find the reference angle of $-\frac{19\pi}{7}$.
5. If θ is an angle such that $\sin(\theta) < 0$ and $\tan(\theta) > 0$, in what quadrant must θ lie?
6. Find the terminal point on the unit circle determined by $t = \frac{\pi}{6}$.
7. A circle with radius 3 has a sector with area 6π . Find the length of the arc surrounding this sector.
8. What is the domain of the function $f(x) = \sin^{-1}(x)$?
9. What is the range of the function $f(x) = \cos^{-1}(x)$?
10. What is the range of the function $f(x) = \tan^{-1}(x)$?
11. What is the amplitude of the function $f(x) = 3\cos(7x - 2) + 5$?
12. What is the period of the function $f(x) = 3\cos(7x - 2) + 5$?

The following questions are based on a triangle of this form:



13. If $b = 3$ and $c = 4$, find a .

14. If $a = 5$ and $c = 7$, find $\tan \theta$.

15. If $a = 4$ and $\theta = 45^\circ$, find c .

16. If $b = 1$ and $c = 2$, find the value of θ .

17. If $b = 1$ and $c = 3$, find the area of the triangle.

In these problems, you are given three parts of an oblique triangle, where side a is opposite angle A , side b is opposite angle B , and side c is opposite angle C . In each problem, follow the instructions to give the desired information.

18. Suppose that $A = 30^\circ$, $C = 80^\circ$, and $b = 10$. Find the length of side a .

19. Suppose that $A = 40^\circ$, $B = 70^\circ$, and $a = 2$. Find the length of side b .

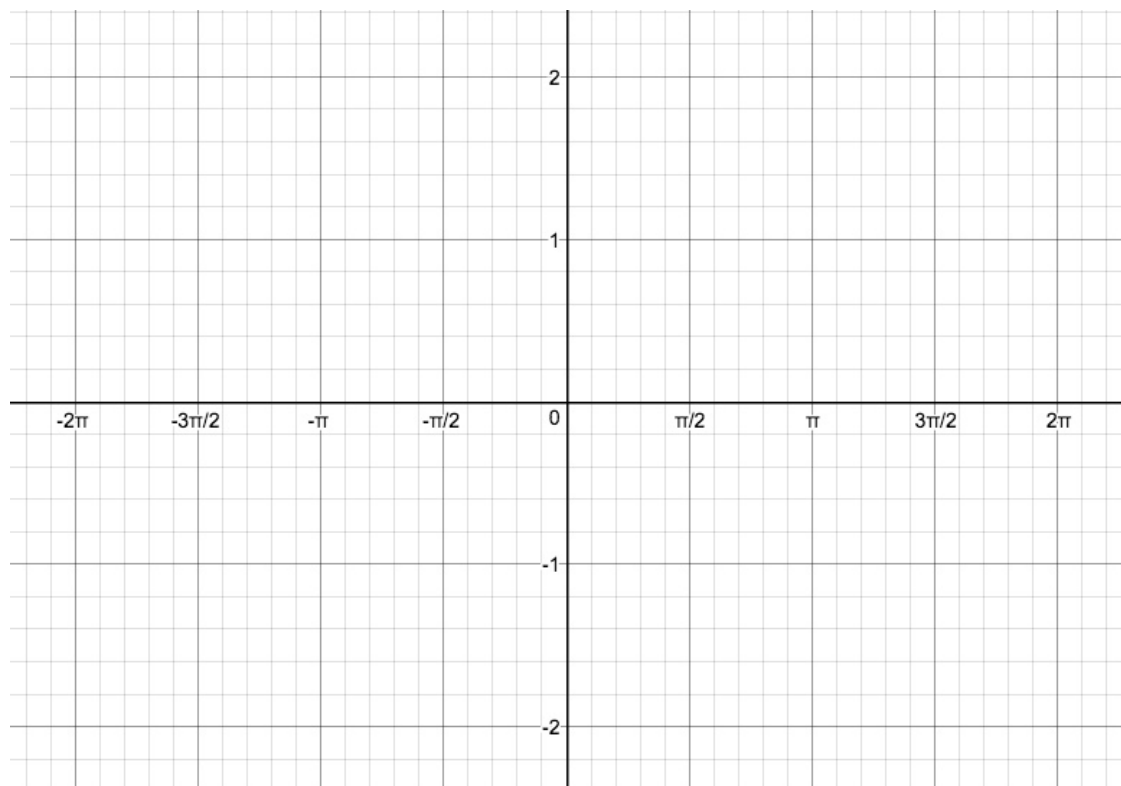
20. Suppose that $a = 8$, $b = 10$, and $c = 12$. Find the measure of angle A .

21. Suppose that $A = 120^\circ$, $b = 8$, $c = 2$. Find the length of side a .

22. Suppose that $A = 35^\circ$, $b = 2$, $c = 7$. Find the area of the triangle.

23. Suppose that $A = 25^\circ$, $a = 12$, and $c = 23$. How many possible solutions are there to this triangle?

24. On the grid below, sketch the graphs of $f(x) = 2\sin(3x)$ and $g(x) = \cos(x) - 1$.



25. Review what the graphs of $\tan(x)$, $\cot(x)$, $\sec(x)$, and $\csc(x)$ look like. (For example, redo the graph-matching problem from Exam 3.)
26. Consider each of the following angles, expressed with inverse trig functions. Determine the quadrant of each angle.
- (a) $\sin^{-1}\left(-\frac{2}{3}\right)$
- (b) $\tan^{-1}\left(-\frac{2}{3}\right)$
- (c) $\cos^{-1}\left(-\frac{2}{3}\right)$

27. For each of the following, find the exact value of the expression (that is, a rounded answer from your calculator will NOT be good enough).

(a) $\sin^{-1}(\sin(\frac{2\pi}{3}))$

(b) $\tan(\tan^{-1}(-4))$

(c) $\csc(\sin^{-1}(0))$

(d) $\sin(\tan^{-1}(-1))$

28. Verify the identity $(1 - \tan x)(1 - \cot x) = 2 - \sec x \csc x$.

29. Verify the identity $\frac{\sin 2x}{\sin x} - \frac{\cos 2x}{\cos x} = \sec x$.

30. Verify the identity $(\cos x + \cos y)^2 + (\sin x - \sin y)^2 = 2 + 2 \cos(x + y)$.

31. Use a half-angle formula to find the exact value of $\tan(15^\circ)$. (A rounded answer from your calculator will NOT be good enough.)

32. Use a half-angle formula to find the exact value of $\sin\left(\frac{\pi}{8}\right)$. (A rounded answer from your calculator will NOT be good enough.)

33. Write the expression $\csc(\tan^{-1} x)$ as an algebraic expression in terms of x .

34. Write the expression $\tan(\cos^{-1} x)$ as an algebraic expression in terms of x .

35. Write the expression $\cos(\sin^{-1} x + \cos^{-1} y)$ as an algebraic expression in terms of x and y .

36. Write the expression $\sin(2 \tan^{-1} x)$ as an algebraic expression in terms of x .

37. Find the general solution of the equation $6\sin(\theta) + 10 = 7$.
38. Find the general solution of the equation $4\cos(\theta) = 1$.
39. Find the general solution of the equation $11 - \tan(\theta) = 3$.
40. Find the general solution of the equation $\cos(\theta)\sin(\theta) - \cos(\theta) = 0$.
41. Find the general solution of the equation $\sin(\theta) = \cos(2\theta)$.
42. Let $z = 1 + i$, let $w = 1 - \sqrt{3}i$.
- (a) Write z and w in polar form.
 - (b) Compute zw .
 - (c) Compute $(zw)^7$.
 - (d) Compute $\frac{z^2}{w^3}$.
43. Consider the point $P = (-\sqrt{6}, \sqrt{2})$ in rectangular coordinates. Convert P to polar coordinates.
44. Consider the point $Q = (3, \pi/6)$ in polar coordinates. Convert Q to rectangular coordinates.
45. Using the variables x and y , convert the polar equation $r = 6 \sec \theta$ to rectangular coordinates.
46. Using the variables x and y , convert the polar equation $r = 2 \cos \theta$ to rectangular coordinates.
47. Using the variables x and y , convert the polar equation $r = 1 + \cos \theta$ to rectangular coordinates.

48. Consider the vector $\mathbf{v} = \langle 7, -2 \rangle$, and let \mathbf{u} be the vector with magnitude $\sqrt{8}$ and direction 135° .
- (a) Write \mathbf{v} in terms of \mathbf{i} and \mathbf{j} .
 - (b) Compute the magnitude of \mathbf{v} .
 - (c) Compute the direction of \mathbf{v} .
 - (d) Write \mathbf{u} in component form.
 - (e) Compute the dot product $\mathbf{u} \cdot \mathbf{v}$.
 - (f) Compute the angle between \mathbf{u} and \mathbf{v} .
 - (g) Compute the vector $9\mathbf{u} + 4\mathbf{v}$ in component form.
 - (h) Determine whether $9\mathbf{u} + 4\mathbf{v}$ is orthogonal to \mathbf{u} .
49. To estimate the height of a mountain above a level plain, the angle of elevation to the top of the mountain is measured to be 32° . One thousand feet closer to the mountain along the plain, it is found that the angle of elevation is 35° . Find the height of the mountain, to the nearest foot.
50. A 96-ft tree casts a shadow that is 120 ft long. What is the angle of elevation of the sun?
51. The Leaning Tower of Pisa leans 5.6° from the vertical. A tourist stands 105 m from its base with the tower leaning directly towards her. She measures the angle of elevation to the top of the tower to be 29.2° . Find the length of the tower, to the nearest meter.
52. A lawn mower is pushed a distance of 200 ft along a horizontal path by a constant force of 50 lb. The handle of the lawn mower is at an angle of 30° from the horizontal. Find the work done.