MATH 1700: TAKE HOME 01 (20 POINTS)

DUE THE DAY OF TEST 1 AT THE BEGINNING OF CLASS

NAME: ____

DIRECTIONS: Make sure your work is neat and complete and uses the techniques demonstrated in class.

1. When graphing an angle in standard position, the vertex of the angle is positioned at the _____________

   with its initial side along the ___________________________.

   Positive angles are indicated by a _____________ rotation while negative angles are indicated by a

   ____________________ rotation.

2. Graph $\theta = -375°$ in standard position. Find two coterminal angles, one positive and one negative.

3. Suppose θ resides in a right triangle opposite a side of length 15. If the hypotenuse of the triangle is 17:

   (a) Find $\sin(\theta)$, $\cos(\theta)$, and $\tan(\theta)$.

   (b) Find a decimal approximation of θ, rounded to the nearest hundredth of a degree.

4. Suppose α is an acute angle with $\cot(\alpha) = 3$.

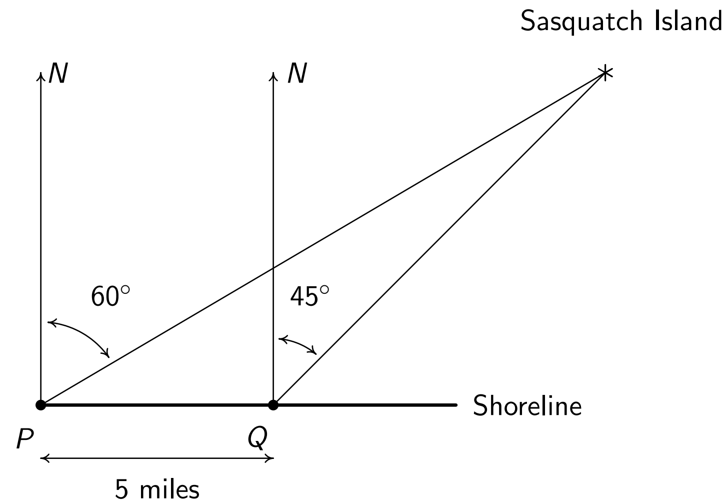
   (a) Find the exact values of the remaining five trigonometric ratios of α.

   (b) Find a decimal approximation of α, rounded to the nearest hundredth of a degree.

5. The angle of inclination from a point on the ground 30 feet away to the top of Lakeland's Armington Clocktower[1] is 60°. Find the height of the Clocktower to the nearest foot.

[1]Named in honor of Raymond Q. Armington, Lakeland's Clocktower has been a part of campus since 1972.

6. Sasquatch Island lies off the coast of Ippizuti Lake. As illustrated below, from a point P on the shore, the bearing to Sasquatch Island is observed to be N60°E. From a point Q that is 5 miles due East of P, the bearing to the island is observed to be N45°E.



Assuming the coastline continues to run due East, find the distance from the point Q to the island.

How far is the island from the coast? Round your answers to the nearest mile.[2]

[2]We'll revisit this problem in Section 12.1 . . .

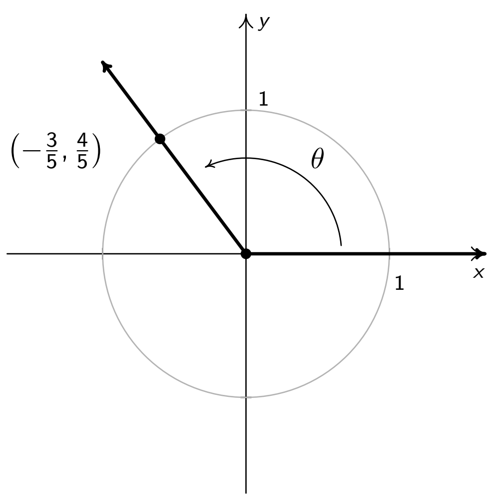
7. On a circle of radius 5 inches a central angle measuring 3 radians would sweep out an arc of length

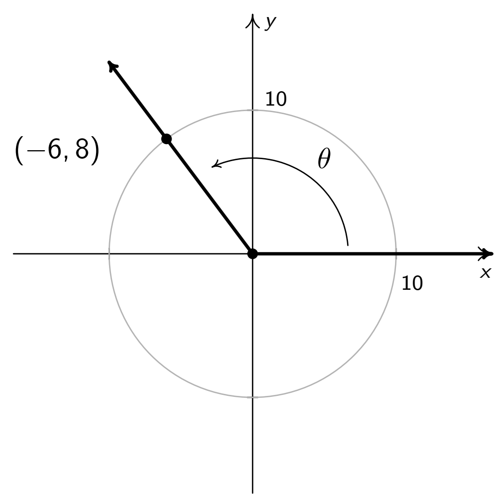
_____________ inches along the circle.

8. Graph $\theta = -\dfrac{4\pi}{3}$ in standard position. Find two coterminal angles, one positive and one negative.

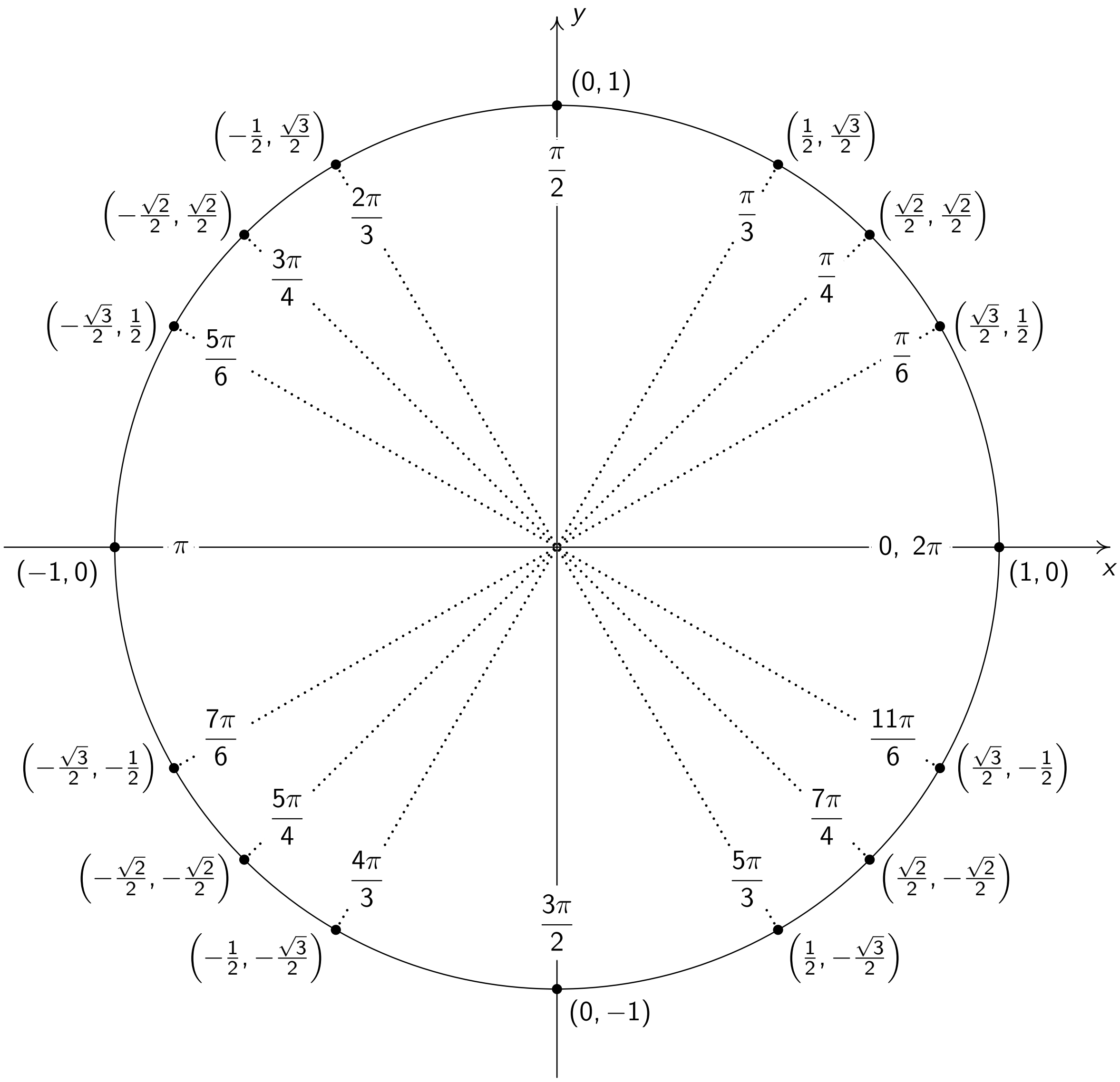
Convert θ from radian measure to degree measure.

9. Find $\cos(\theta)$ and $\sin(\theta)$ for each of the angles depicted below.





10. Use the Unit Circle to find the exact values requested below.



- $\sin\left(\frac{\pi}{6}\right)$
- $\cos\left(\frac{7\pi}{4}\right)$
- $\sin\left(\frac{\pi}{2}\right)$
- $\cos\left(\frac{5\pi}{6}\right)$
- $\sin\left(\frac{4\pi}{3}\right)$

- $\cos\left(-\frac{\pi}{3}\right)$
- $\sin\left(-\frac{\pi}{4}\right)$
- $\cos\left(-\frac{5\pi}{3}\right)$
- $\sin\left(-\frac{7\pi}{6}\right)$
- $\cos(117\pi)$

11. For each of the angles below:

- Graph the angle in standard position and determine the reference angle.
- Find the sine and cosine.

(a) $\theta = 300^\circ$

(b) $\theta = -135^\circ$

(c) $\theta = 510^\circ$

(d) $\theta = \dfrac{2\pi}{3}$

(e) $\theta = -\dfrac{\pi}{6}$

(f) $\theta = \dfrac{13\pi}{4}$

12. Suppose θ is a Quadrant II angle with $\sin(\theta) = \frac{12}{13}$.

(a) Find the exact value of $\cos(\theta)$.

(b) Find the exact values of $\sin(\theta + \pi)$ and $\cos(\theta + \pi)$.

13. Suppose θ is a Quadrant IV angle with whose terminal side contains the point $\left(\frac{1}{2}, -1\right)$.

Find the exact values of $\sin(\theta)$ and $\cos(\theta)$.

14. Solve the following equations:

(a) $\sin(\theta) = \frac{\sqrt{2}}{2}$.

(b) $\cos(t) = -\frac{1}{2}$.

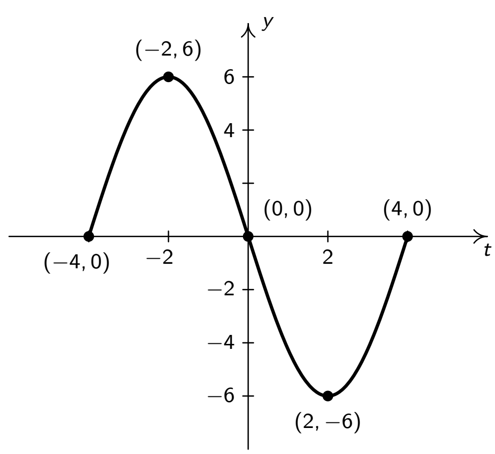
(c) $\sin(\alpha) = 0$.

15. Explain why there are no real number solutions to the equation: $\cos(t) = -1.01$.

16. Graph one cycle of $f(t) = 3\sin\left(2t - \dfrac{\pi}{4}\right) + 4$. Label five 'key points' as was done in the lecture.

Find the period, frequency, amplitude, vertical shift (baseline), and phase (horizontal) shift.

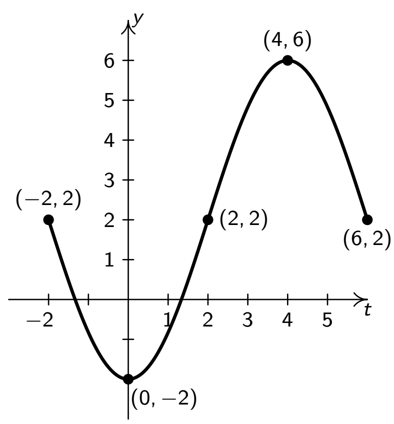
17. Find a formula for the sinusoid below in the form $S(t) = A\sin(\omega t + \phi) + B$.



18. Graph one cycle of $f(t) = 2\cos\left(\frac{\pi - t}{3}\right) - 1$. Label five 'key points' as was done in the lecture.

    Find the period, frequency, amplitude, vertical shift (baseline), and phase (horizontal) shift.

19. Find a formula for the sinusoid below in the form $C(t) = A\cos(\omega t + \phi) + B$.



20. The London Eye is a popular tourist attraction in London, England and is one of the largest Ferris Wheels in the world. It has a diameter of 135 meters and makes one revolution (counter-clockwise) every 30 minutes. It is constructed so that the lowest part of the Eye reaches ground level, enabling passengers to simply walk on to, and off of, the ride. Find a sinusoid which models the height h of the passenger above the ground in meters t minutes after they board the Eye at ground level.

21. For the angle $\theta = \dfrac{7\pi}{6}$

(a) Sketch θ in standard position.

(b) Find the values of the six circular functions of θ, if they exist.

- $\cos(\theta) =$
- $\sin(\theta) =$
- $\sec(\theta) =$
- $\csc(\theta) =$
- $\tan(\theta) =$
- $\cot(\theta) =$

22. Suppose terminal side of θ, when plotted in standard position, contains the point $(-7, -24)$.

Find the exact values of the circular functions of θ.

- $\cos(\theta) =$
- $\sin(\theta) =$
- $\sec(\theta) =$
- $\csc(\theta) =$
- $\tan(\theta) =$
- $\cot(\theta) =$

23. Suppose $\tan(\theta) = 5$ where $\pi < \theta < \dfrac{3\pi}{2}$. Find $\sin(\theta)$ and $\cos(\theta)$.

24. If $\sec(\theta) = 3$ where θ is a Quadrant IV angle, find the values of the remaining five circular functions of θ.

25. Solve the following equations:

(a) $\csc(\theta) = 2$

(b) $\sec(t) = -2$

(c) $\tan(\theta) = -\sqrt{3}$

(d) $\sec(t) = -\sqrt{2}$

26. Explain why there are no real number solutions to $\csc(\theta) = -\dfrac{3}{4}$.

27. (a) Graph one cycle of $S(t) = 4\sec\left(\dfrac{\pi - 2t}{3}\right) - 1$. Find and label the 'quarter marks' and asymptotes.

(b) Find the formula for a cosecant function which has the same graph as S.

28. (a) Graph one cycle of $T(t) = 3\tan(\pi - 2t)$. Find and label the 'quarter marks' and asymptotes.

(b) Find the formula for a cotangent function which has the same graph as T.