

Math 418: Worksheet 10

November 15, 2020

1 Convert the following angles. If the given angle is in degrees, convert to radians. If it is in radians, convert to degrees.

a) 45°

b) $\frac{\pi}{8}$

c) 225°

d) $\frac{-11\pi}{4}$

e) 30

f) π°

2 Find the coordinates on the unit circle of the endpoint of a radius that makes an angle of:

a) $\frac{\pi}{3}$ with respect to the positive x-axis.

b) $\frac{-11\pi}{4}$ with respect to the negative y-axis.

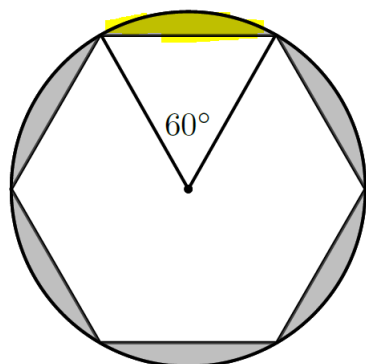
c) 5000π with respect to the positive x-axis.

3 Annie the ant crawls around the unit circle counterclockwise starting at $\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$ and stops the first time they reach $\left(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$. How far did the ant crawl?

4 Brock the ant crawls around the unit circle clockwise starting at $(0, -1)$ and stops the third time they reach $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$. How far did the ant crawl?

5 Carol the centipede crawled counterclockwise around the unit circle starting at $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$. Carol crawled $\frac{5\pi}{3}$ units around to reach point P . What are the coordinates of point P ?

- 6 Consider the circle shown below with an inscribed regular hexagon with sidelength 1 unit. What is the area of the yellow shaded region? What is the area of the gray shaded region? Note the gray region includes the yellow region. Hint: The triangle shown is an equilateral triangle.



- 7 Evaluate:

- a) $\sin \frac{\pi}{6}$
- b) $\cos \frac{\pi}{6}$
- c) $\tan \frac{\pi}{6}$
- d) $\sec \frac{\pi}{6}$
- e) $\csc \frac{\pi}{6}$
- f) $\cot \frac{\pi}{6}$

- 8 Suppose $0 < \alpha < \pi$ and $\cos \alpha = \frac{-2}{3}$.

Evaluate:

- a) $\sin \alpha$
- b) $\tan \alpha$

- 9 Tommy and Joe are having a mathematical debate over the following problem. Suppose $-\pi < \beta < \frac{-\pi}{2}$ and $\tan \beta = \frac{7}{2}$. Tommy believes that $\sin \beta = 7$ and $\cos \beta = 2$. Joe believes that Tommy isn't correct.

- a) Evaluate $\sin \beta$ and $\cos \beta$.
- b) Is Tommy right or wrong?
- c) If Joe is correct how could you convince Tommy?

10 Evaluate:

a) $\tan \frac{13\pi}{6}$

b) $\csc \frac{5\pi}{6}$

c) $\cot \frac{-3\pi}{4}$

d) $\sec \frac{-2\pi}{3}$

e) $\csc \frac{\pi}{2}$

11 Find the domain of $f(x) = \frac{2x^3}{\sin(x)-1}$

12 Find the range of $g(x) = 3 \cos(2x) + 9$

13 Find all θ in $[0, 2\pi]$ such that $\sin^2 \theta - 2 \sin \theta + 1 = 0$