Worksheet 9

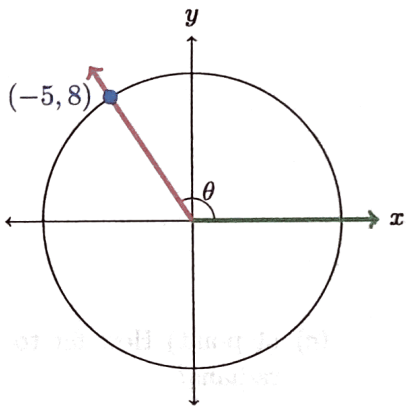
MATH 006B - Schmidt

Winter 2021

Instructions:

- **Show ALL your work to receive credit!** Cross off anything you do not wish to be graded.
- Simplify your answers as much as possible. For instance, evaluate 2^2, but not $\sqrt{2}$.
- **Work with your group** on the following exercises. Each of you will turn in your own work via Gradescope.
- **Your group** may ask the TA questions, which the TA will answer with leading questions (not answers) to help guide you to the answer.

1. (3 points) Consider the pictured angle.



   (a) (1 point) Find $\tan(\theta)$.

   $\tan(\theta) = \frac{8}{-5}$

   (b) (1 point) Find an angle measure ϕ with $-\frac{\pi}{2} < \phi < \frac{\pi}{2}$ satisfying $\tan(\phi) = \tan(\theta)$. *Leave your answer in exact form. It may involve a trig function or inverse trig function.*

   $\tan(\theta) = -\frac{8}{5}$

   $\phi = \tan^{-1}\left(\frac{8}{-5}\right)$

   (c) (1 point) Find θ.
   Leave your answer in exact form. It may involve a trig function or inverse trig function.

   $\theta = \tan^{-1}\left(\frac{8}{-5}\right) + \pi$

2. (3 points) Find exact values of each of the following quantities. Draw a picture justifying each answer.

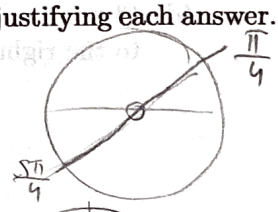
   $-\frac{\pi}{2} < \phi < \frac{\pi}{2}$

   (a) (1 point) $\sin^{-1}(\sin(\frac{5\pi}{4}))$

   $\sin^{-1}(\sin(5\pi/4))$

   $\sin = \sin(5\pi/4)$

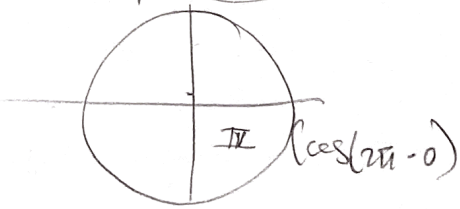
   $\frac{\pi}{4}$



   (b) (1 point) $\cos^{-1}(\cos(\frac{11\pi}{6}))$

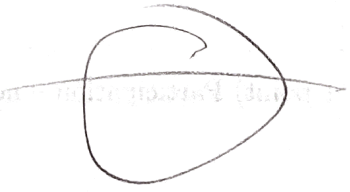
   $2\pi - \theta$

   $\hookrightarrow 2\pi - \frac{11\pi}{6} = \frac{\pi}{6}$



   (c) (1 point) $\tan^{-1}(\tan(-1))$

   $\tan\left(\frac{\sin}{\cos}\right)$

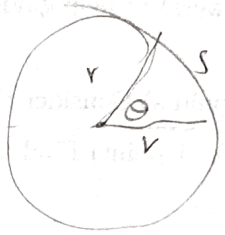


3. (8 points) Maisy is seated on a ferris wheel at the 3 o'clock position when the wheel begins rotating counter-clockwise. The wheel has a radius of 30 feet and the center of the wheel is 40 feet above ground. **Suppose the wheel makes exactly one revolution.**
Show all work and leave your answers in exact form. They may involve trig functions or inverse trig functions.

(a) (1 point) How high above ground (in feet) is Maisy after she has swept out θ radians?

40θ

(b) (3 points) What angle (in radians, between 0 and 2π) has Maisy swept out when she is 50 feet above the ground and some (positive) distance to the right of the center of the wheel?



(c) (1 point) How far to the right of the center of the wheel is Maisy after she has swept out θ radians?

30θ

(d) (3 points) What angle (in radians, between 0 and 2π) has Maisy swept out when she is 20 feet to the right of the center of the wheel and some distance below the center of the wheel?

4. (1 point) Participation – no submission