Assignment due on September 15, by 9.35 am.

Submit on Carmen via the "Assignments" tab.
In your papers, use the heading: **"Math 1149, Assignment 3, First and last name"**.
Show all your work, i.e., show all the steps needed to solve a problem.
Write legibly.

In all exercises below, give exact answers. This means, in particular, that if your answer is a number such as $\sqrt{5}$ or $\frac{\sqrt{2}}{3}$, it should appear on your paper in this form, and not in the (necessarily approximate) decimal form that your calculator might give you if you type $\sqrt{5}$ or $\frac{\sqrt{2}}{3}$.

1. (3 points) An angle θ on the second quadrant is such that $\sec(\theta) = -\frac{5}{4}$.
   (a) Find a point different from the origin on the terminal side of θ.
   (b) Find all trigonometric function values of θ.

2. (3 points) Given that θ is on the third quadrant and $\sin(\theta) = -\frac{\sqrt{15}}{8}$, *use trigonometric identities* to find all trigonometric function values of θ. (Beware: signs matter.)

3. (3 points) Given that $\tan\left(\frac{12\pi}{5}\right) = \sqrt{5+2\sqrt{5}}$, find all trigonometric functions of $\theta = \frac{12\pi}{5}$. You do *not need* to rationalize your answers. (To solve this exercise in the right way, it is paramount that you determine the quadrant where $\frac{12\pi}{5}$ is.)

4. (3 points) Suppose that α is an *acute* angle (measured in radians). Use trigonometric identities, cofunction identities, or reference angles to rewrite each of the trigonometric function values below in terms of $\sin(\alpha)$ or $\cos(\alpha)$ *only*. In some cases, it might be helpful to make a little sketch of the situation, either on paper or in your mind, to help you solving the exercises. To illustrate what I expect you to do, the first two parts are already solved, so you need to start solving (c).
   (a) $\sec\left(\frac{\pi}{2}-\alpha\right)$. **Solution.** We know that $\sec\left(\frac{\pi}{2}-\alpha\right) = \frac{1}{\cos\left(\frac{\pi}{2}-\alpha\right)}$. Since sine and cosine are cofunctions, we also know that $\cos\left(\frac{\pi}{2}-\alpha\right) = \sin(\alpha)$. Therefore, $\sec\left(\frac{\pi}{2}-\alpha\right) = \frac{1}{\sin(\alpha)}$.
   (b) $\cos(\pi-\alpha)$. **Solution.** The angle $\beta = \pi-\alpha$ is on the second quadrant, and its reference angle is α. Thus, $\cos(\pi-\alpha) = -\cos(\alpha)$ (the negative sign is because of $\pi-\alpha$ being on the second quadrant).
   (c) $\cot\left(\frac{\pi}{2}-\alpha\right)$.
   (d) $\tan(\pi+\alpha)$.
   (e) $\tan(\pi-\alpha)$.
   (f) $\sin(2\pi-\alpha)$.
   (g) $\cos(2\pi+\alpha)$.
   (h) $\cos(\alpha-2\pi)$.

5. (3 points) The point $P = \left(\frac{\sqrt{21}}{7}, \frac{2\sqrt{7}}{7}\right)$ is on the terminal side of an acute angle θ.
   (a) Show that P is on the unit circle.
   (b) Find sine, cosine, and tangent of all the following angles:

$$\theta, \quad -\theta, \quad \pi+\theta, \quad \pi-\theta, \quad \frac{\pi}{2}-\theta, \quad 2\pi+\theta, \quad 2\pi-\theta$$

   (To do this, you can use the geometry of the circle and/or various properties of angles and trigonometric functions, such as: reference angles, coterminal angles, cofunction identities, even/odd properties of trigonometric functions.)