MATH 6 – PRACTICE MIDTERM 2

Name:_____

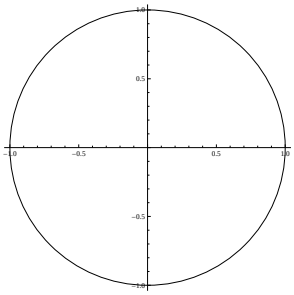
FOR FULL CREDIT

SHOW ALL WORK

NO CALCULATORS

1. Find the area under the curve and above the x-axis from $x = 0$ to $x = \ln 2$ of the function $f(x) = \frac{e^x}{(e^x+2)^2}$.

2. Indicate on the unit circle below where the angle $\frac{7\pi}{4}$ is. Then, evaluate $\sin\frac{7\pi}{4}$, $\cos\frac{7\pi}{4}$ and $\tan\frac{7\pi}{4}$.



3. Newton's law of cooling says that the change in temperature of an object is proportional to the difference between the object's temperature and the (constant) ambient temperature.

   (a) Write a differential equation modeling Newton's law of cooling.

   (b) Solve the differential equation you wrote in part (a).

   (c) Suppose the room is 60°F, and a cup of tea cools from 200° to 130° in 10 minutes. Write a function giving the temperature of the tea. You may leave your answer in terms of ln and powers of e.

4. Suppose a bicycle wheel with 2 foot diameter makes 150 rotations per minute.

   (a) Find the angular velocity of the wheel.

   (b) Find the linear velocity of a point on the outside edge of the wheel.

5. Suppose $\sin\theta = \frac{15}{17}$ and θ is an acute angle (that is, it lies in the first quadrant). Compute $\cos\theta$, $\tan\theta$, $\sec\theta$, $\cot\theta$ and $\csc\theta$.

6. You stand 100 feet from the base of a building and estimate that the angle to the top of the building is 60°. Based on this estimate, what is the height of the building? How far are you from the top of the building? (Partial credit will be given for a picture giving a visual representation of the problem.)