Math 135 Prep. for Calculus Fall 2015 Prof. Janeba Worksheet 1

Group names:____

1. Fill in the remaining coordinates and angles in the diagram on page 4. Give each angle in both degrees and radians.
   It will be helpful to know that:
   (a) the diagram is a circle, centered at the origin, and
   (b) the diagram is symmetric about both axes and about the diagonal lines $y = x$ and $y = -x$; that is, if you reflect the diagram about any of those four lines, the diagram is unchanged.

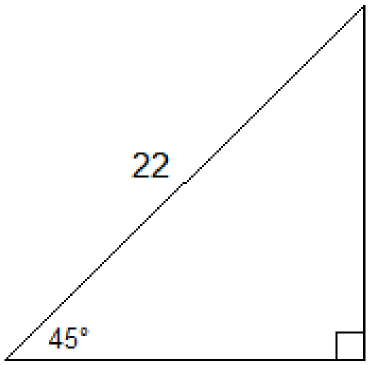
2. The diagram we have just completed gave us the coordinates $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ and $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$. But where did these come from? We will find out below.
   (a) Draw a right triangle with angles (in degrees) 45-45-90, and with hypotenuse of length 1. Use geometry (not the diagram above nor trigonometry) to find the lengths of the other two sides.

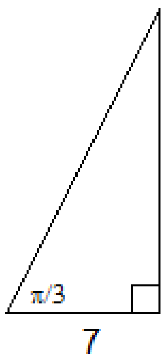
   (b) Redraw your triangle inside a unit circle with one corner on the unit circle and one at the origin, in such a way that it gives (confirms, really) the coordinates of one of the points on our diagram.

   (c) Draw another right triangle with angles (in degrees) 30-60-90, and with hypotenuse of length 1. Use geometry (not the diagram above nor trigonometry) to find the lengths of the other two sides. (Ask Prof. Janeba for a hint if needed).

   (d) Redraw your second triangle inside a unit circle with one corner on the unit circle and one at the origin, in such a way that it gives (confirms, really) the coordinates of another one of the points on our diagram.

3. "Solve" the given triangles exactly. (This means find the lengths of all remaining sides and measures of all remaining angles, without decimal approximation.)

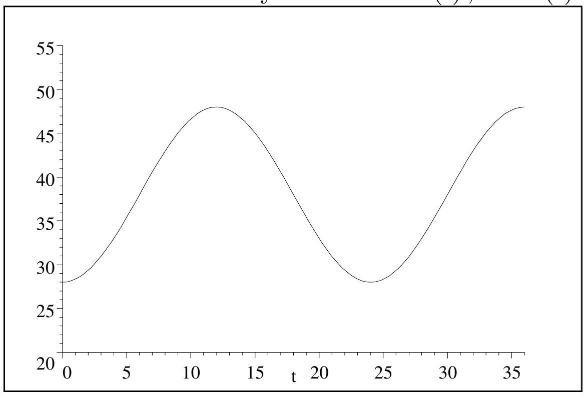




4. Given the table of values for $\sin(t)$ (with t in *radians*), fill in the (exact) values for $\cos(t)$. Use the cosine values to draw a careful graph of the function $f(t) = \cos(t)$.

t	$\sin(t)$	$\cos(t)$
0	0	
$\frac{\pi}{6}$	$\frac{1}{2}$	
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	
$\frac{\pi}{2}$	1	
$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2}$	
π	0	
$\frac{5\pi}{4}$	$-\frac{\sqrt{2}}{2}$	
$\frac{3\pi}{2}$	-1	
$\frac{11\pi}{6}$	$-\frac{1}{2}$	

5. Find a possible formula for the function whose graph is given. Instead of a horizontal shift of $\sin(t)$, choose from a not-horizontally shifted $\pm\sin(t), \pm\cos(t)$



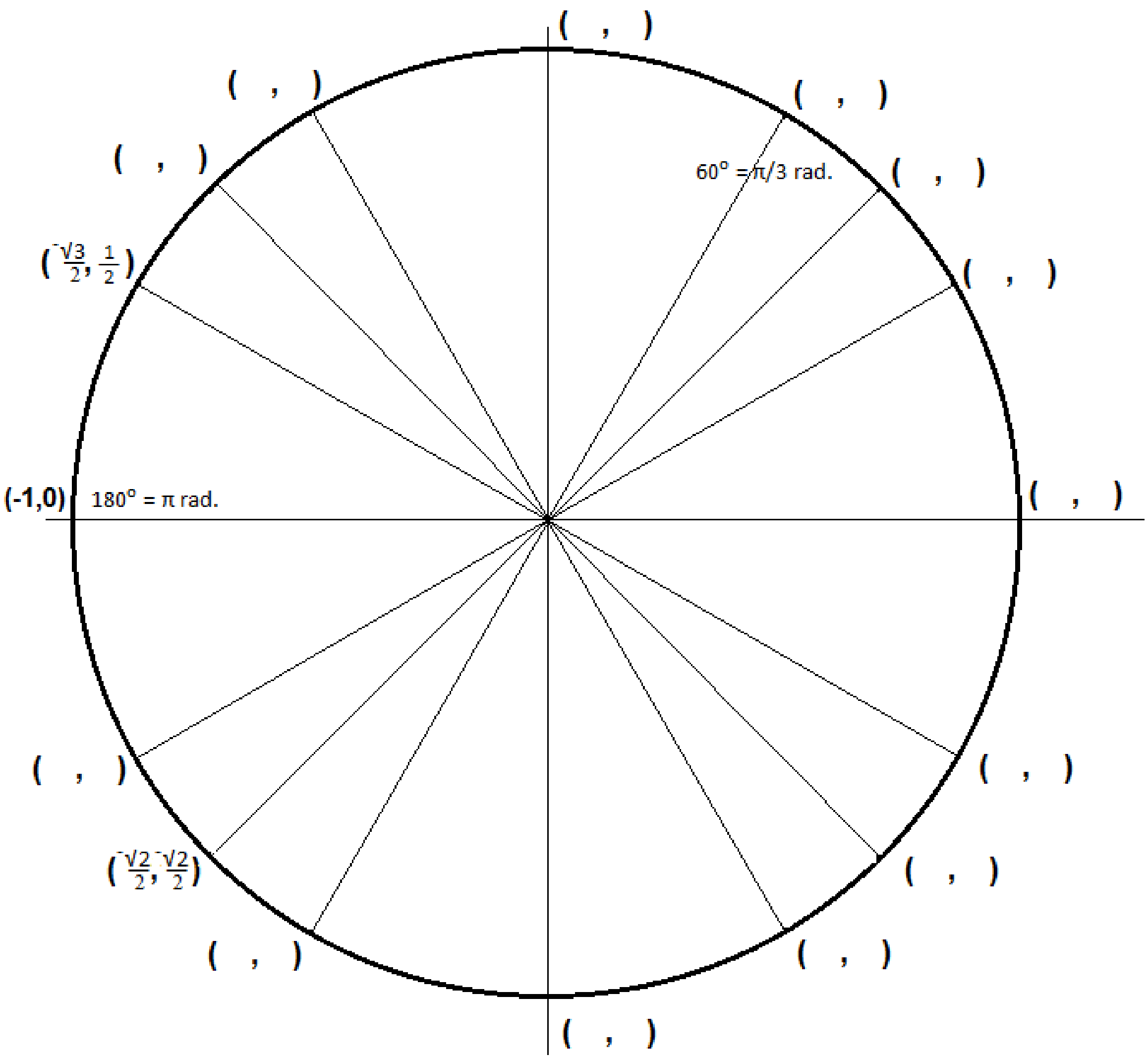


Figure 1: