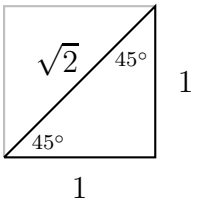
Mth 30, Homework 9 on sections 5.2, 5.3, 5.4

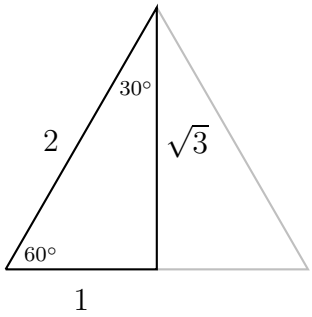
Due by Wed, Apr 23.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

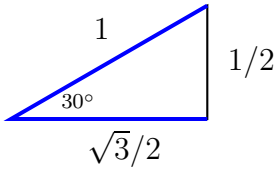
Section 5.2 Unit Circle: Sine and Cosine Functions

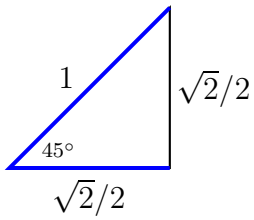
Memorize these two special triangles with their angles and side lengths (coming from the Pythagorean theorem):

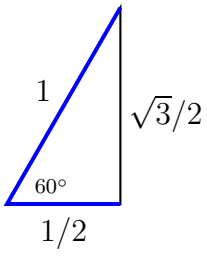




Shrinking them to make their hypotenuses 1, so they fit in the unit circle, gives:







(1) Use the above triangles to fill in this table with exact values:

angle t	$30°$ or $\pi/6$	$45°$ or $\pi/4$	$60°$ or $\pi/3$
$\cos t$			
$\sin t$			

(2) Draw these angles in standard position and find their reference angles:

(a) $155°$ **(b)** $260°$ **(c)** $\dfrac{7\pi}{4}$

(Hint: The reference angle is found by moving up or down from the terminal side to the x-axis. In degrees it is always between 0 and 90.)

(3) Find the exact value of $\sin(5\pi/3)$ using the following steps.

- **(a)** Find the reference angle for $5\pi/3$.
- **(b)** Find the exact value for sine of the reference angle. (It is one of our special angles.)
- **(c)** Check which quadrant $5\pi/3$ is in and decide if sine is positive or negative there.
- **(d)** Then $5\pi/3$ equals part (b) with the sign from part (c).

(4) Find the exact value of $\cos(11\pi/4)$ using a reference angle as in the last question.

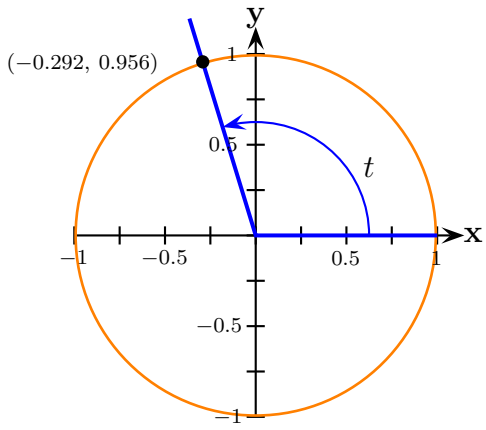
(5) If $\cos t = -3/4$ and t is in quadrant II, find $\sin t$.
(Hint: Use the Pythagorean Identity.)

(6) If $\sin t = -1/8$ and t is in quadrant IV, find $\cos t$.

Section 5.3 The Other Trigonometric Functions

(7) Give the formulas for each of $\sec t$, $\csc t$, $\tan t$ and $\cot t$ in terms of $\cos t$ and $\sin t$.

(8) Find all six trigonometric functions of the angle t displayed here:



(9) Compute the exact value of $\csc(\pi/4)$
(Hint: exact means 'not a decimal'. Your answer should have a square root – but make sure it's not in the denominator.)

(10) Use a reference angle to find the exact value of $\cot(7\pi/6)$ as follows:

- **(a)** Draw the angle $7\pi/6$ and note the quadrant.
- **(b)** Find the reference angle. Is it $\pi/6$?
- **(c)** Find $\cot$ of the reference angle.
- **(d)** Adjust the sign if necessary depending on the quadrant.

(11) Suppose $\cos t = -1/3$ and $\sin t < 0$.

- **(a)** Which quadrant is angle t in?

(b) Find $\sec t$

(c) Find $\tan t$

(Hint: For part (c) you'll need the Pythagorean Identity.)

Section 5.4 Right Triangle Trigonometry

(12) Use a cofunction identity to fill in the missing angle:

$$\cos(\pi/5) = \sin(\quad ? \quad)$$

(13) You walk 70 feet away from the base of a tower and find that the angle of elevation to the top of the tower is $52°$. Give the height of the tower as a decimal in the correct units.

(Hint: 'Angle of elevation' means the angle from the horizontal up to what you are looking at. Draw a diagram for this question, showing the right triangle. Decide which trigonometric ratio is needed.)

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes or section in the textbook.
- Ask me about it after class.
- Come to my office hours: Mon 2:00 - 3:00, Wed 2:00 - 3:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.