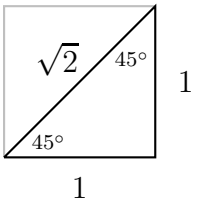
Mth 30, Homework 10 on sections 5.2, 5.3, 5.4

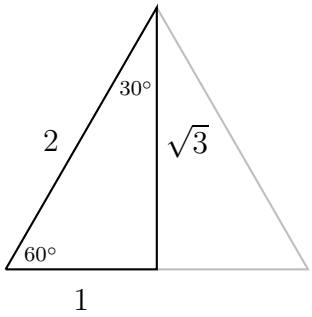
Due by Wed, Apr 22.

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

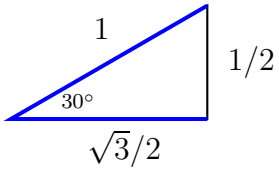
Section 5.2 Unit Circle: Sine and Cosine Functions

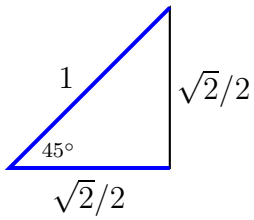
Memorize these two special triangles with their angles and side lengths (coming from the Pythagorean theorem):

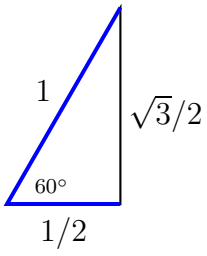




Shrinking them to make their hypotenuses 1, so they fit in the unit circle, gives:







(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 $\sin t$.

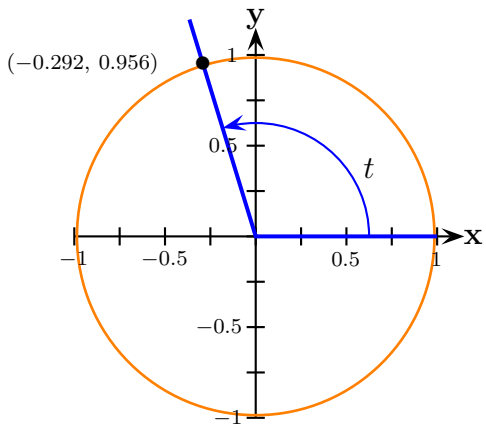
(Hint: Use the Pythagorean Identity.)

(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, just using the coordinates $(-0.292,\ 0.956)$ of the dot:



(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're stuck on a question:

- Ask me about it after class.
- Come to my office hours: Mon 4:30 - 5:30, Wed 4:30 - 5:30 in CP 317.
- Go to the Math Tutorial Lab in person in CP 303 or online.