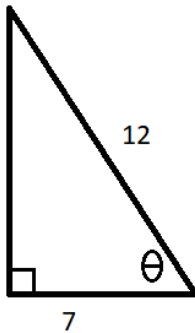# Lab 2: Right Triangle Trig

Unit Objectives: 2b, 2c, 2d   Total Points: 31

Part 1: Basic Right Triangle Trig

1. **(4 points) (w)**   Use the picture to find the exact values of each of the following. You do *not* need to solve for θ. Show how you solved for the missing side length; you are not required to show any other work.

a) $\sin(\theta)$

b) $\cos(\theta)$

c) $\tan(\theta)$

d) $\csc(\theta)$

e) $\sec(\theta)$

f) $\cot(\theta)$

2. **(3 points) (w)**   Solve the triangle below. Remember, that means that you need to find all missing angle measures and sides lengths. Do not round.
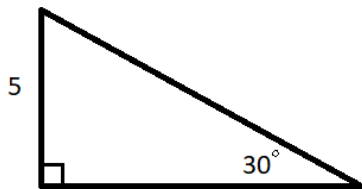

Part 2: Applications of Right Triangle Trig

For the following problems, you are encouraged (though not required) to draw and label a diagram where one is not given.

3. **(4 points) (w)**   A safety regulation states that the maximum angle of elevation for a rescue ladder is 72°. If a fire department's longest ladder is 115 feet, then what is the maximum safe rescue height, to the nearest foot?

4. **(4 points) (w)** A ski slope on a mountain has an angle of elevation of 25.3°. The *vertical* height of the slope is 1856 feet. How *long* is the slope, to the nearest foot?

5. **(4 points) (w)** A wheelchair ramp must rise 32 **inches** to meet the door of a courthouse. If the ramp's angle of elevation is not to exceed 4.1°, what is the minimum *horizontal* length of the ramp, to the nearest **foot**?

6. **(4 points) (w)** A water tower is located $x = 350$ feet from a building. From a window in the building, an observer notes that the angle of elevation to the top of the tower is 39° and the angle of depression to the bottom of the tower is 25°. See the picture below. How tall is the tower, to the nearest foot?
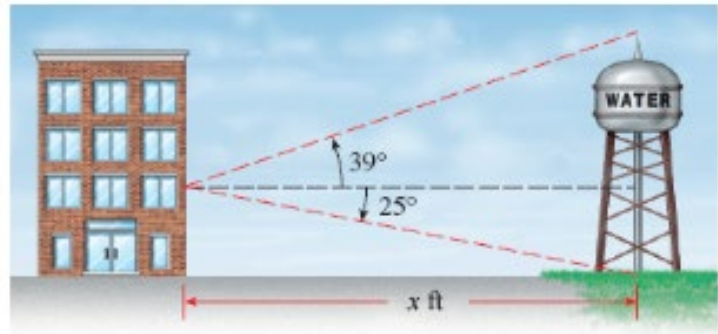
7. **(4 points) (w)** When driving across flat land, you see a mountain in front of you. The angle of elevation to the peak is 3.8°. When you drive 15 *miles* closer, the angle of elevation is 10°. Find the height of the mountain, to the nearest *foot*. **Note:** There are 5280 feet in a mile.

8. **(4 points) (w)** An airplane descends at an angle of depression of 6° from the horizontal, from a height of 34,000 feet. If the descent is in a straight line at 450 mph, how long does it take, to the nearest *minute*? (**Hints:** Start by finding the distance the plane has to travel. Then use the given speed to help you figure out how long it will take. Be careful with your unit conversions.)

Grading Guide

Problem 1: Solving for the missing side is worth 1 point (and you must show your work for credit). Each value you have to find is worth half a point.

Problem 2: Each side or angle measure that you have to solve for is worth 1 point. You must show your work for credit.

Problems 3 – 8: You'll earn 3 points if you make a minor math error, 2 if you make a fairly major math error but still overall indicate that you know how to attack the problem, and 1 if you demonstrate some understanding of this type of problem but are clearly not using an appropriate strategy. You must show your work for credit.