Lab 6: The Laws of Sines and Cosines

In this lab, you'll be using the Law of Sines and the Law of Cosines, as well as other facts about triangles, in order to solve application problems.

Please do these problems on a ***separate*** sheet of paper, showing your work clearly and completely. *You do not need to submit this page.* If you use letters to represent sides and angles, **you must include a clearly labeled picture**. This assignment is worth 24 points, 4 points per problem.

You'll earn 3 points if you make a small math error, have minor notation or unit issues, **or** if your work is mostly there but difficult to follow.

You'll earn 2 points if you make a fairly significant error or omission but are using an appropriate technique, **or** if you have a correct answer but major issues with your work shown (including not drawing a picture where needed).

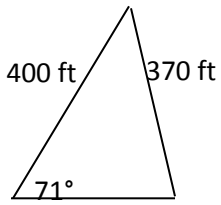
You'll earn 1 point if you do *something* correctly triangle-wise, but are really not using the right technique for the problem, **or** if you make very little progress, but at least it's in the correct direction.

Task 1: At noon, two tracking stations on Earth (A and B), 20 km apart, measure the angles of elevation of a rocket. The rocket is **not** between the stations, but to the **east** (right) of both of them. From Station A, the angle of elevation is 41° and from Station B it is 75°. Find the height of the rocket to one decimal place, and include units.
HINT: Look at #33 on pg. 448 of your text to make sure you've visualized this correctly.

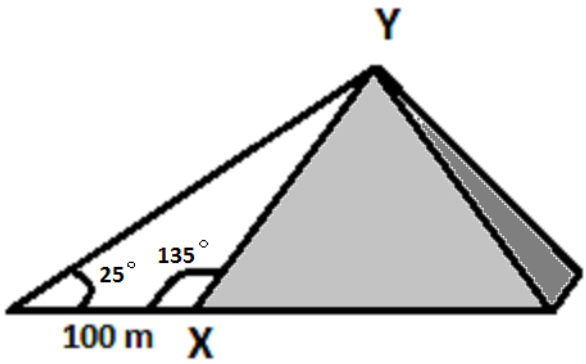
Task 2: A flagpole is on a hill that makes an angle of 18° with the horizontal (i.e., that is the hill's angle of elevation). How tall is the flagpole if its shadow is 14 meters down the slope when the angle of elevation of the sun is 31°? Find the height to one decimal place, and include units.
HINT: Look at #39 on pg. 448 of your text to make sure you've visualized this correctly.

Task 3: A triangular lot sits at the corner of two streets that intersect at an angle of 58°. One street side of the lot is 105 ft, and the other is 131 ft. How long is the back of the lot (the third side)? Find the length to the nearest foot.

Task 4: Explain why a triangle with the measurements below can't exist. (Please note that the picture may not be drawn to scale, so your justification needs to include calculation and can't just be based on the picture.)



Task 5: How tall is the pyramid, to the nearest meter? (You can ignore the "3D-ness" of the situation and think of a cross-sectional view.)



Task 6: A farmer has a triangular field with sides 120 yards, 170 yards, and 220 yards. Find the area of the field to the nearest square yard (hint: you'll need your new triangle area formula from section 6.3). Then find the acreage of the field, to 1 decimal place, if 1 acre = 4840 square yards.