Calculus I - Project 3 Winter 2022

This project is due at the beginning of class on Wednesday, Week 10. It may be turned in in person, or uploaded into Moodle. It should be written in full sentences, and typed, although please note that equations and math symbols may be written in by hand. While it is acceptable to work together in thinking about this project, each student is expected to write up results independently. More information about what is expected from write ups for all our class projects is found in the Guidelines Rubric.

So now that you are living away from home, your parents are planning to do some renovations to the house. Their first project is to build a greenhouse onto the house. They are going to knock out the entire length of the south wall of the house, and replace some bottom portion of the wall by a huge sloped piece of glass. They have already decided the amount they will spend on the pane of glass, and that the triangular ends of the greenhouse will be made of various materials they have lying around, so they don't need your help in determining cost at all. But...

The floor space in the greenhouse is only considered usable if they can both stand up in it, so part of it will be unusable, and they don't know how much. Of course, this depends on how they configure the greenhouse. They want to get the maximum amount of usable floor space that they can, but they are at a real loss to know how much of the bottom portion of the wall should be knocked out, and how much usable space they will get. Fortunately, you are taking calculus, and can solve this problem, even though you don't have the exact measurements of the room. Amaze them! Write a letter home which explains what they should do. Be sure to include why this works as well as some drawings to help them understand.

Here are a few ideas to help you start:

Find the right *angle* for this problem! Most likely, a sideview of the situation will be very helpful.

Even though you don't know the exact dimensions of the room, you can still do the work and let your parents fill in those details. Just decide on some letters to stand for the things you want to know but aren't given here. Be sure to work with these as the "unknown knowns" to paraphrase Donald Rumsfeld....things that are known, but to which you are not privy; don't give them numerical values that you make up.