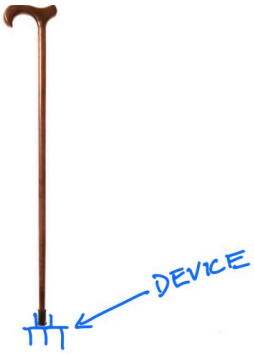
BME 200
Final Project

Due: Midnight Nov 15, 2020

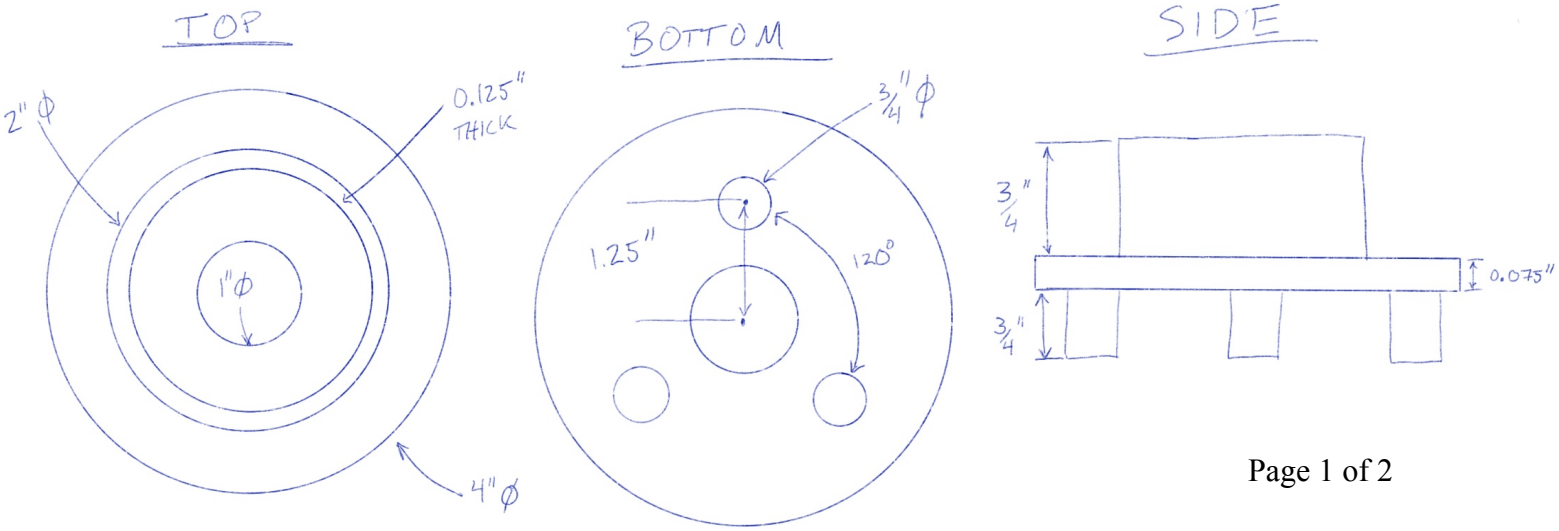
Background

One day your friends in the business school come to you because they need an engineer to flesh out their idea. They think that the demand for walking canes will spike over the next few years, but they also have market research that shows that the walking canes on the market today are too wobbly. As a result, seniors are afraid they are going to fall when they use a walking cane.

Sensing a business opportunity, your friends want to create an assistive device for walking canes that will slip onto the bottom of the cane and provide more stability, like this:



Being business majors, your friends have sketched out an initial prototype out on a napkin. And they even have some ideas about the dimensions! It looks like this:



Your business friends know that you are a Solidworks expert and can quickly render their sketch into a 3D drawing. They also know that you can do some modeling to optimize the device to support a senior's weight!

Deliverables

To receive full credit for the final project, you will need to perform the following tasks:

1. Create a Solidworks drawing based on the original dimensions. Save a PDF of this drawing. (10 points)
2. Perform a simulation of a static load on the device assuming a force of 1500 N. Apply the load at the bottom of the barrel on top. The three feet are fixed. Save a PDF of the stress results. (10 points)
3. Adjust the thickness of the base plate (the 4" diameter circle) and re-run simulations until there are no stresses greater than 44 MPa when a 1500 N load is applied. (The yield stress of ABS plastic, a commonly used material for 3D printers, is ~ 44 MPa.) Save a PDF of the stresses on your optimized design to prove that it does not fail. (5 points)
4. Save a PDF of your final, optimized design with all dimensions turned on. (5 points)
5. Determine the cost to 3D print your final, optimized device. Assume that ABS material costs $20/kg. (5 points)

Compile all your results into a *very brief* document, with each number clearly labeled. Support your calculations in #5 by including the volume of your device. **Upload this document along with separate files for the saved PDFs from steps 1–4. You will upload a total of 5 files.**