ME 122 Homework 1 Spring 2018

This homework is due at the start of the first class in the second week of the course. Use the engineering format for problems 2 and 3.

1. Purchase a new, small, portable notebook for making notes and sketches on your project for the class. Complete the rest of this assignment and bring your notebook to class.

   Suitable notebooks are available at local bookstores, office supply stores and other retail stores like Fred Meyers. We recommend notebooks with blank pages or with square grids to help with sketching.

   As part of your assignment make the following modifications to your notebook.

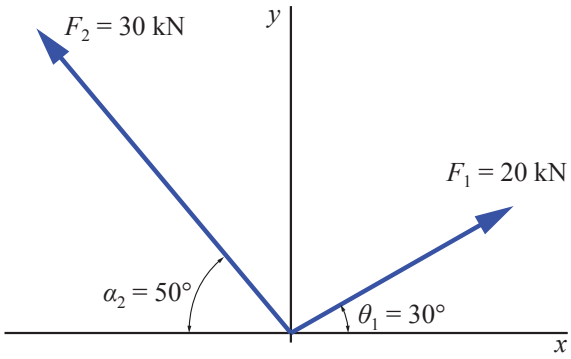
   a. On the first page, list
      - Your name and some way to be contacted, e.g. your email address, in case the notebook is found by someone else.
      - An optional title for your notebook, e.g., "My idea companion", or "ME 122 Ideas", or "Brain Overflow" or ...
      - An inspiring quote or photo related to engineering, creativity, problem-solving, design or some other aspect of ME 122. If you don't already have an inspiration, a google search for "engineering design quotes" will give you a good start.

   b. At the top of separate pages of the notebook, add these titles
      - Things that bug me (on one page)
      - Things that bug my friends and family (on a separate page)
      - Problems in society that might have an engineering solution (on another page, etc.)
      - Opportunities for creative problem-solving in my community (neighborhood, city, ...)

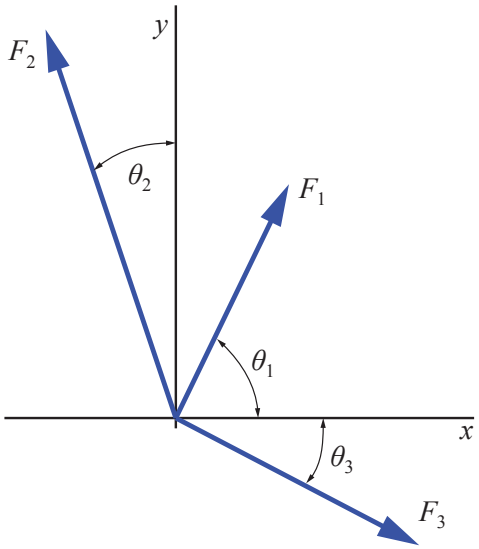
      Leave room (or perhaps a separate blank page) for at least 10 ideas under each heading.

   c. Make at least two entries under each of the separate pages (headings) in part (b). You will probably need to explain the purpose of the assignment to your family and friends.

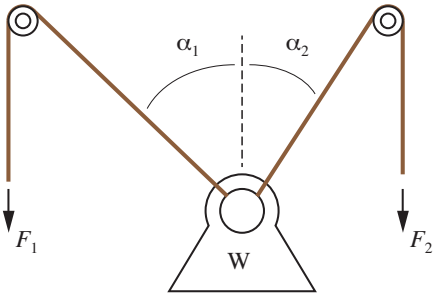
2. Determine the magnitude and direction of the resultant force for the force system shown to the right. The direction of the resultant should be measured counterclockwise starting at the *x*-axis. Draw the resultant force and label the computed angle on an x-y coordinate system. Answer: 33.0 kN and 93.4°.



3. Given that $F_1 = 70\text{lb}_f$, $F_2 = 150\text{lb}_f$, $F_3 = 90\text{lb}_f$, $\theta_1 = 55°$, $\theta_2 = 22°$ and $\theta_3 = 38°$, determine the magnitude and direction of the resultant force for the force system shown to the right. The direction of the resultant should be measured counterclockwise starting at the x-axis. Draw the resultant force and label the computed angle on an x-y coordinate system. Answer: 151.31lb and 68.73°



4. Weight *W* is being lifted by two ropes that pass over pulleys as depicted in the sketch. What are the resultant horizontal and vertical forces on the weight? Your answer should be a formula using the symbols in the sketch as well as any additional information you may need to add.



5. Given the same weight *and* pulley contraption as in the preceding problem, what are the resultant horizontal and vertical forces on the weight when F_1 and F_2 are applied at an angle to the vertical? Your answer should be a formula using the symbols in the sketch as well as any additional information you may need to add.