**ENGR 122**   **Homework 4**

NOTE: Use engineering format for problems 1-4. Use non-engineering format for problems 5-8. This is an individual assignment.

1. An engineer is using the pliers shown below to twist a pin at P. Based on the parameters given, find the following:
   a. Moment about P due to Force 1. 170 in-lbf CW
   b. Moment about P due to Force 2. 252.25 in-lbf CCW
   c. Net moment about P due to Force 1 and Force 2. 82.25 in-lbf CCW
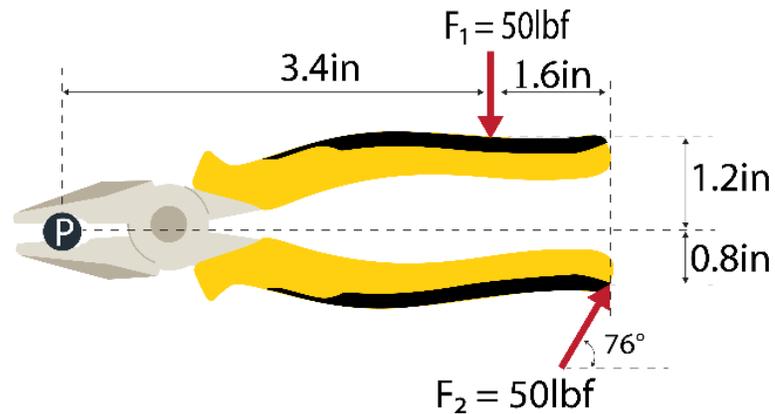
2. Rework Problem 1 using Mathcad to compute your answers. Set up the page using engineering format. Remember, when using units in Mathcad, that "lbs" is written as "lbf" which is pounds-force and that you must use the "deg" unit for your angles.

3. Two loads are applied to a shelf bracket, one from above and one from a string tied to the upper tip. Compute the total moment that these two loads create around the bottom tip of the bracket. 710.63 in-lb CW
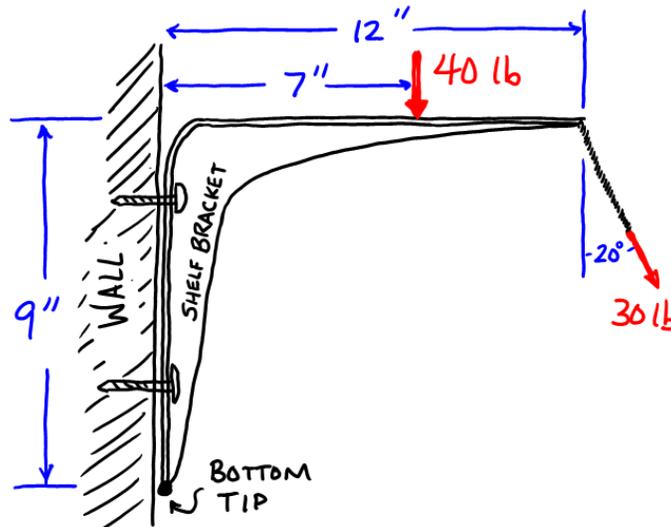
4. The tension in the rope that tethers the tree to the tractor is 2000N. The weight of the tire swing is 1100N. What is the moment about the base of the tree (Point A) due to the rope and tire swing? 7451.48 N-m CCW
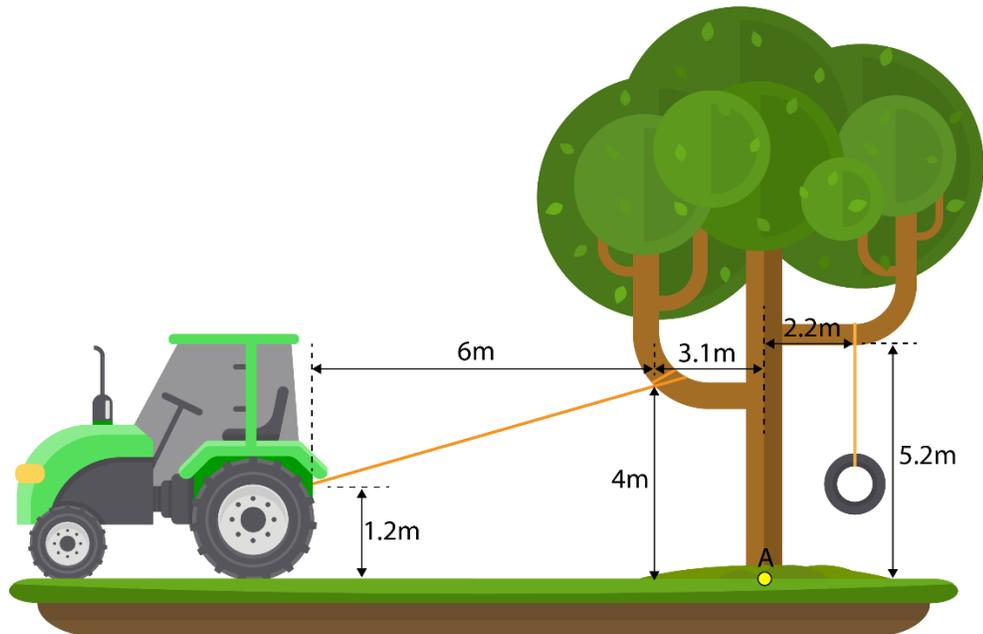
5. Complete the implementation of the IR sensor from class. Provide screen shots of your sketch with the homework. Please have it working as shown in the presentation. If you would like to challenge yourself, try to get the Arduino to perform some action if the IR sensor detects and object (e.g., turn a servo, light an LED, make a noise, etc.).

   Note: Have your Arduino/IR circuit out on your table with the program running so that your instructor or class assistant can quickly check your work. Do not turn your homework in at the front; have it ready so that the instructor / assistant can grade your IR activity.

6. Review the list of sensors/devices that can be checked out for the ENGR 122 project. Choose one to research in more depth. Write a few sentences about how the sensor/device works. Include some potential applications for the sensor/device.

7. Add another idea to your "Idea Wallet" by thinking about something that could be fixed, improved, or developed in your community (Louisiana Tech, Ruston, or your hometown). Please name the project idea, state how it applies to your community, write up at least a two-sentence description of the idea, and provide pictures when it makes sense to do so. *You don't need to try to find a solution to the problem at this point!*

   You are encouraged to speak with someone from the community to help form an idea. If you consult someone for project ideas, indicate who you spoke with in your homework.

8. Bring your Arduino, electrical components (LED, RGB LED, jumper wires, resistors) and a switch to class. Review the presentation on hooking up your switches from ENGR 120 Class 5 entitled, "Digital Input from Switches" to wire your switches prior to attending class. You do not have to have the switch mounted on the aluminum plate like in ENGR 120. You just need to have the switch wired to provide input to the Arduino.