

# EME 150A Fall 2015 Homework #01

Monday, September 28, 2015

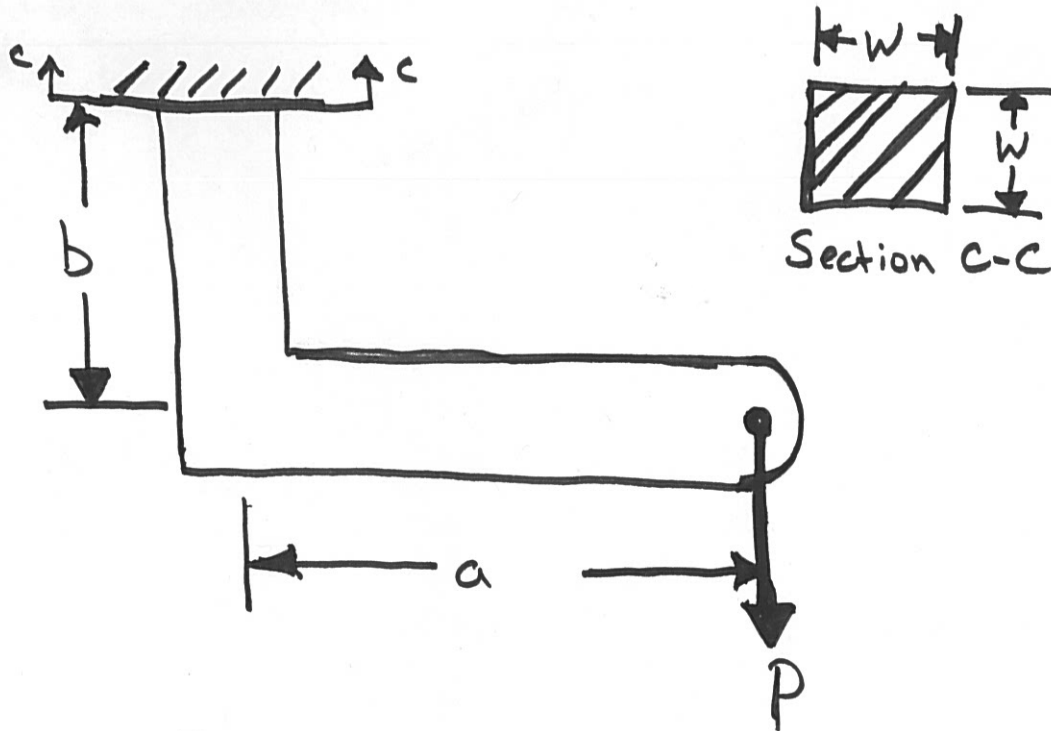
**DUE: Monday, October 05, 2015 before class in Box D in the MAE department.**

## Problem 1

Your manufacturing company has been contracted to manufacture 10,000 custom cotter pins that secure the PTO to external attachments for a new tractor model. The delivered outer diameter of the pins must be  $0.625 \pm 0.01$ ". Your quality control team has run some test batches of the pins and have found that the manufacturing process produces a mean diameter of 0.621" with a standard deviation of 0.004". How many more pins will you have to make to ensure you deliver 10,000 pins that meet the criteria?

## Problem 2

**Part 1** Determine the internal loads and the maximum normal stress at section C-C (symbolic form).



**Part 2** It has been determined that the design factor for this part is to be 3 with respect to yielding. If the material is 1018 steel, will a cross section width of  $w = 1\text{cm}$  of the square bar be able to meet this

design factor if only the maximum normal stress is considered with  $P = 60N$ ,  $a = 6cm$ , and  $b = 5cm$ ?  
Compute the actual factor of safety to show this.

### Problem 3

Draw the shear and moment diagrams for the beam shown in the figure.

