

Your Name: _____

Your TA name: _____

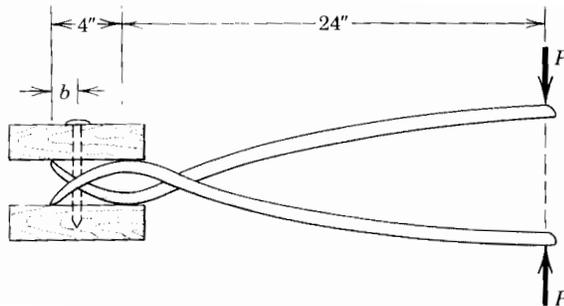
Section day: _____

MAE325, Homework 2

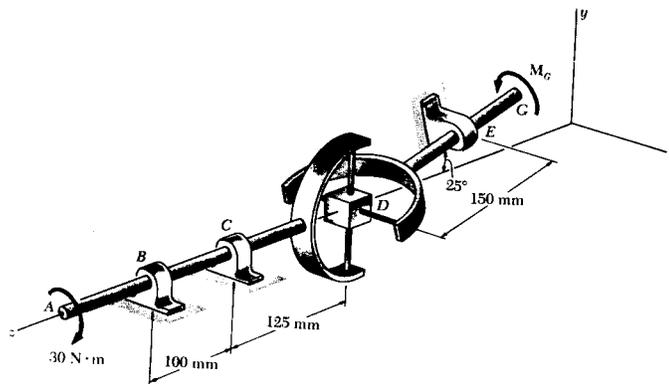
(Due Wednesday, September 8, 1999, 9:04 AM)

Please follow the homework directions from the course WWW pages, the directions of the first homework, and the advice marked on your graded homework.

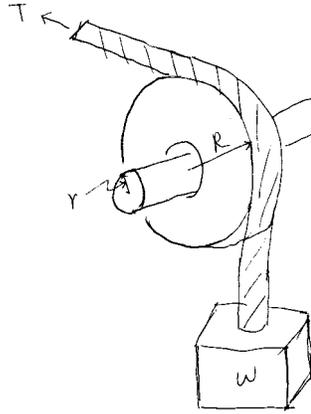
1. The two planks are connected by a large spike. If a force $P = 30\text{ lbf}$ is required on the handle of each crowbar to loosen the spike. Calculate the corresponding tension T in the spike. Also find the value of b which will eliminate any tendency to bend the spike. State any assumptions which you make, [Supposed answers: $T = 390\text{ lbf}$, $b = 2.15\text{ in}$]



2. Two shafts AC and EG, which lie in the vertical yz plane, are connected by a universal joint at D. The bearings at B and E don't exert any axial force. A couple of magnitude 30 Nm (clockwise when viewed from the positive z axis) is applied to shaft AC at A. At a time when the arm of the crosspiece attached to shaft AC is vertical, determine (a) the magnitude of the couple M which must be applied to shaft EG to maintain equilibrium, (b) the reaction at B, C, and E.



3. Problem 3-9 in the Norton text.
4. A pulley with an unlubricated journal bearing. The axle is held rigidly and cannot rotate. It fits loosely in the pulley hole with radius r (so the shaft has a radius slightly less than r). The outer radius of the pulley is R . Given $w = 100\text{lb}$, $r = 0.2\text{in}$, $R = 2\text{in}$ and $\mu = 0.3$, Find T when a) the weight is going up at a steady speed, and b) the weight is going down at a steady speed. (A 2D analysis is fine.)



5. Extra credit. Look at the bike brake example that starts in the book on page 108. Give a pointed and detailed critique of what you think is wrong with the analysis. This is for *you* to think about. Please do not ask the TAs any questions about this problem. You may discuss the problem with other students (whom you must cite, as always). But please do not tell anyone a solution or ask anyone for a solution.