ES201 Problem set #11

(NOTE: for all questions, use acceleration due to gravity as 9.80665 m/sec^2.)

(1) A 600 N load is applied at C. (a) Write out the Free Body Diagram for the full body A-E. DO NOT include the wall as part of any of these diagrams! (b) Write out the FBD for the body B-E. (c) Write out the FBD for the section FDE. (d) Write out the FBD for the section BF. (e) Write out the three static equations for the section FDE. (f) Solve for the reaction forces at A and E.
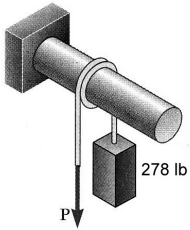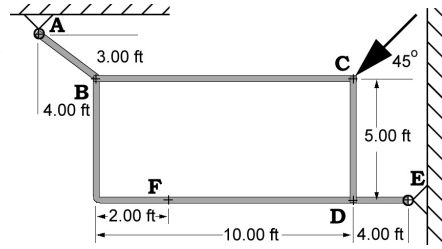
(2) A rope is wrapped $1\frac{1}{2}$ times around a horizontal rod. For the weight shown, if $\mu_s=0.28$, determine the range of P for which equilibrium is maintained.

(3) A band brake is used to control the speed of a drum rotating at constant speed. If $\mu_d=0.33$ and a couple of 200 N·m is applied to the drum, determine the corresponding magnitude of P that is exerted of the end of the lever at D when the drum is rotation (a) counterclockwise, (b) clockwise.
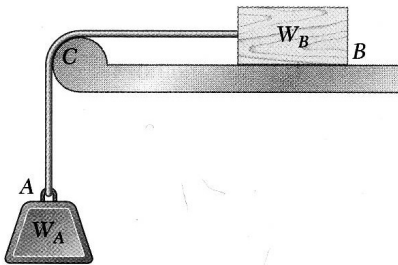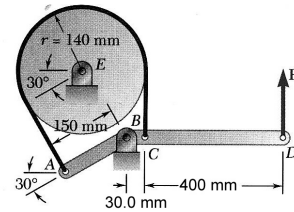
(4) For the setup shown, $\mu_s=0.45$ for both the rope-edge and the block-slab interactions. If $W_a = 75.0$ lb, determine the lowest weight for B for which equilibrium is maintained.