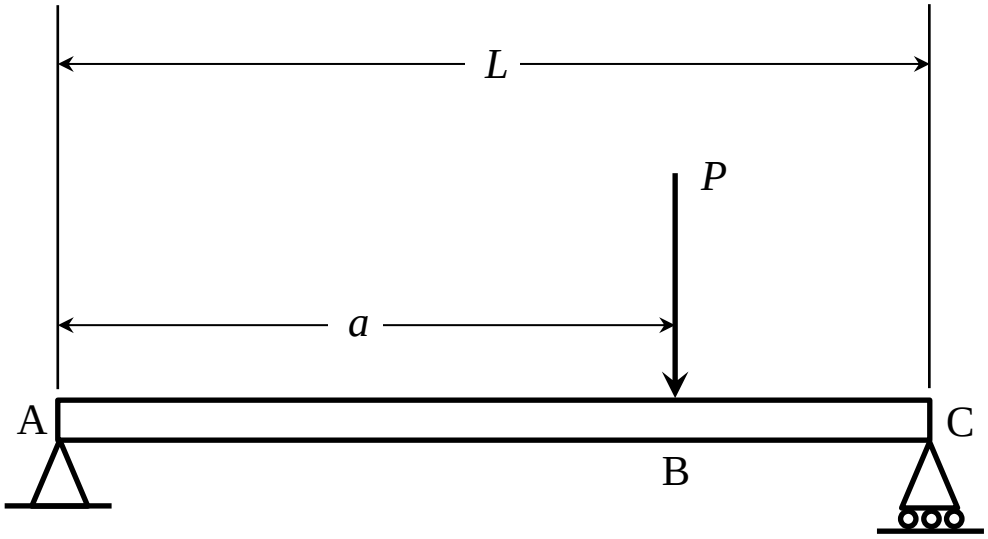
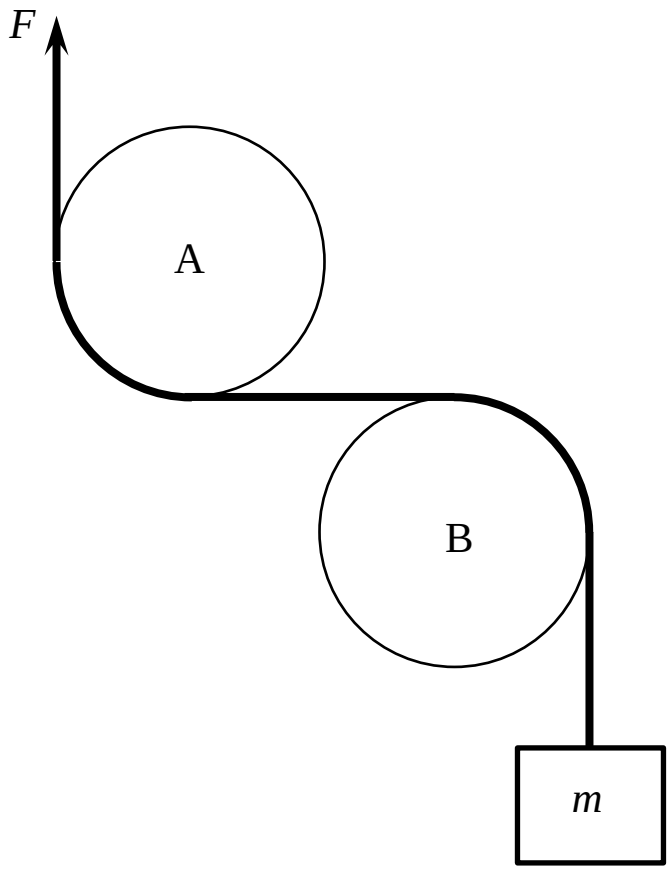
Wright State University ME 2120 Statics, Fall 2012
Department of Mechanical and Materials Engineering

FINAL EXAM
Open Book, Closed Notes, Do not write on this sheet, Show all work

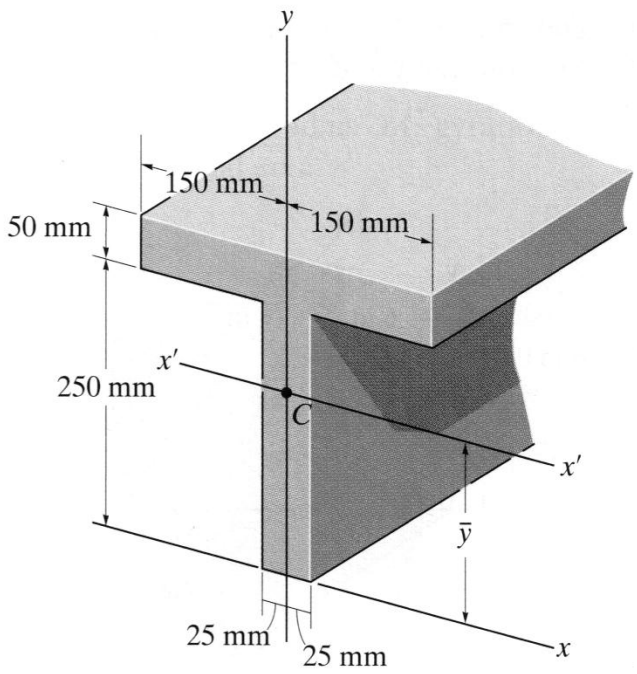
Problem 1: (40 points) Sketch the graphs of the shear and bending-moment equations for the following situation, where the beam length is *L* and the point load force is *P*.



Problem 2: (15 points) A mass of 20 kg is attached to a rope wrapped around two fixed nonrotating drums as shown. The coefficient of friction is 0.25. Determine the minimum force F required to start raising the mass. (Answer: F = 430.4 N)

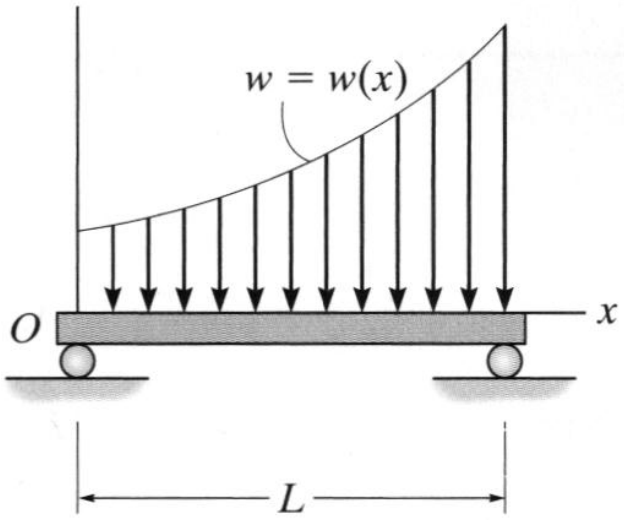


Problem 3: (25 points) Determine the area moment of inertia of the T-beam about the centroidal x'-axis. (Answer: $I_{x'} = 2.22 \times 10^8$ mm^4)



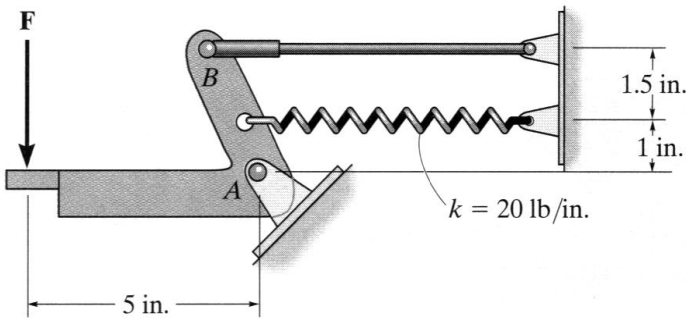
Problem 4: (20 points) Draw the free-body diagrams for the four following situations. Do not solve!

(a)



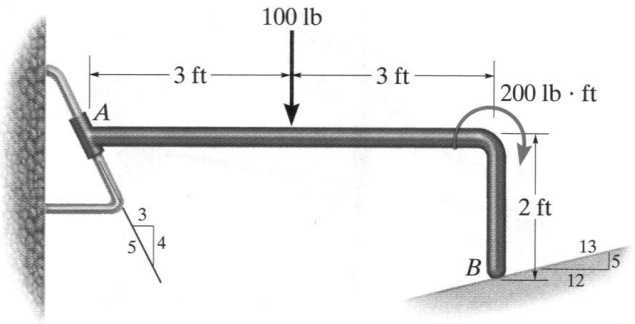
Determine the reactions on the beam at the points of contact.

(b)



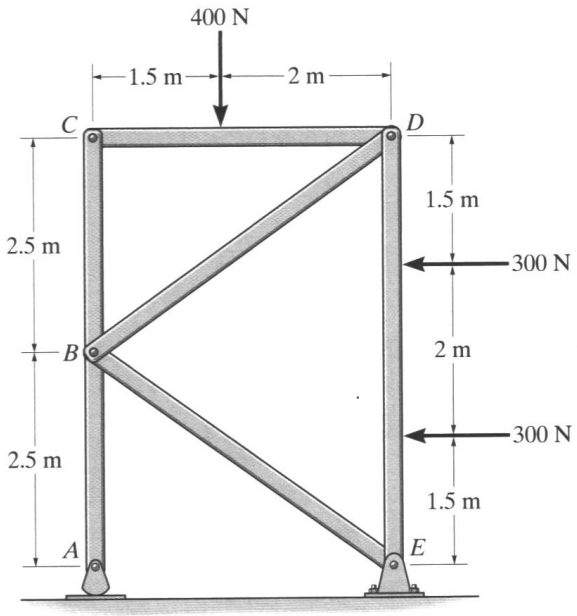
The operator applies a vertical force to the pedal so that the spring is stretched 1.5 in. and the force in the short link at *B* is 20 lb. Determine the reaction at point *A*.

(c)



Determine the reactions on the bent rod which is supported by a smooth surface at *B* and by a collar at *A*, which is fixed to the rod and is free to slide over the fixed inclined rod.

(d)



Determine the horizontal and vertical components of force which the pins at *A*, *B*, and *C* exert on member *ABC* of the frame.