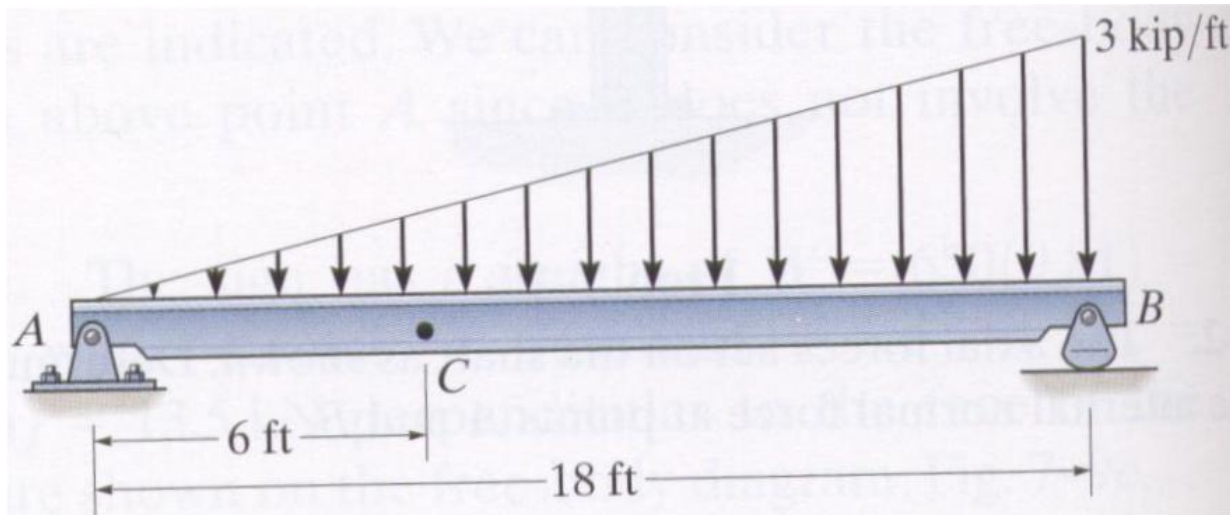


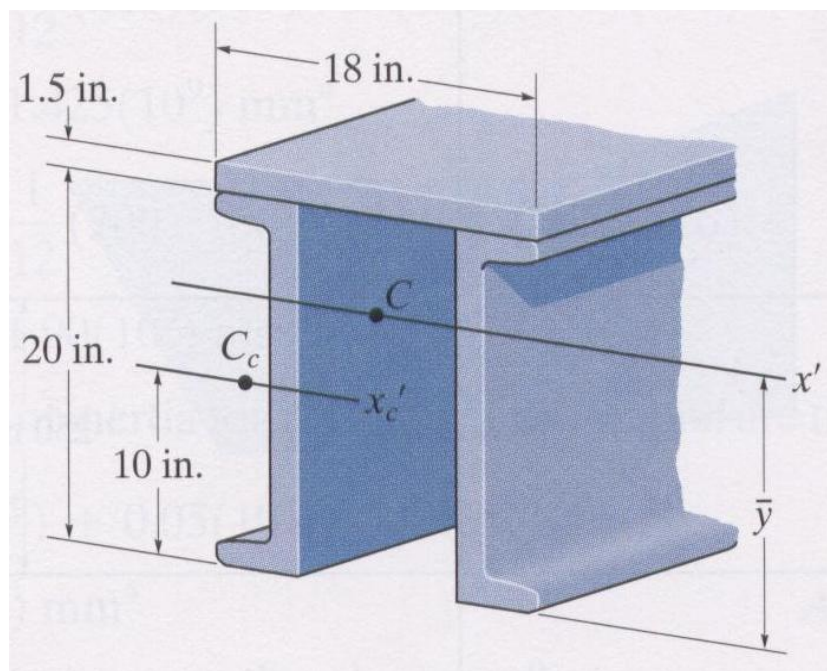
FINAL EXAM

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

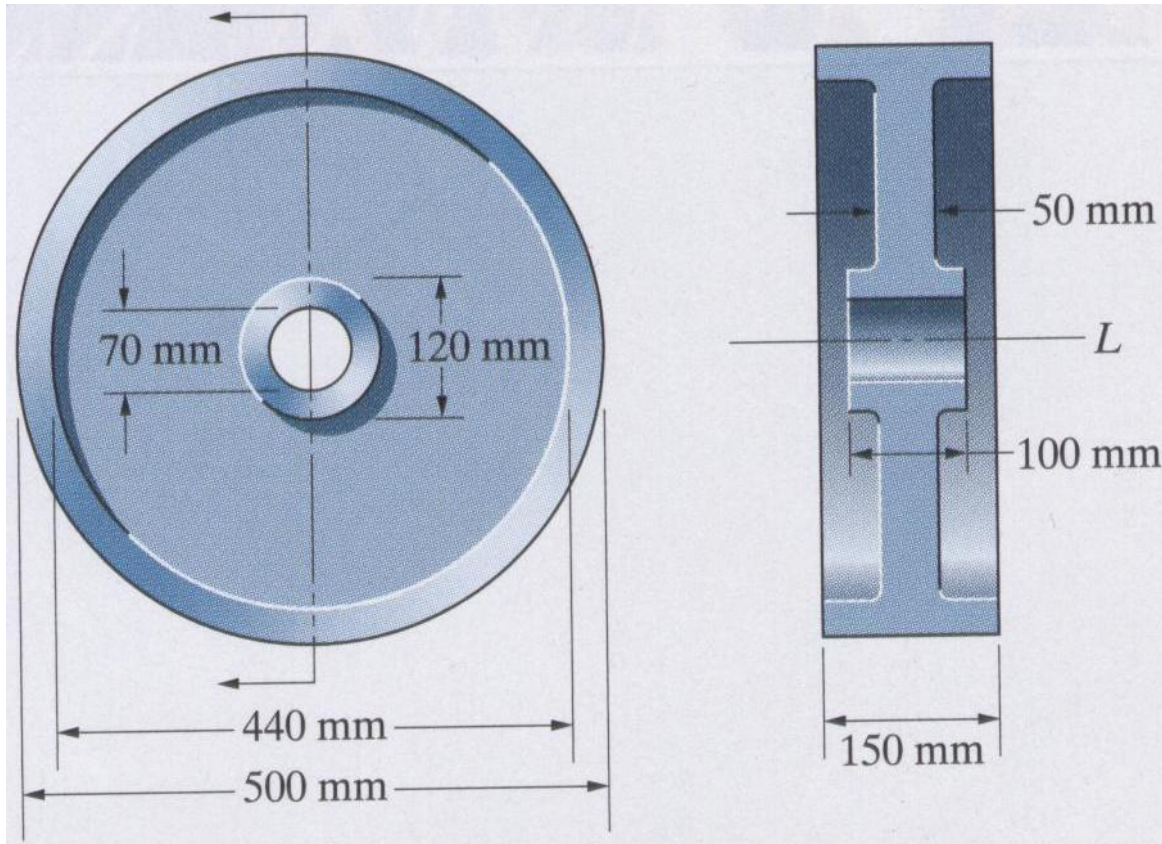
1. (20 points) Determine the shear force and moment acting at a section passing through point C in the beam.



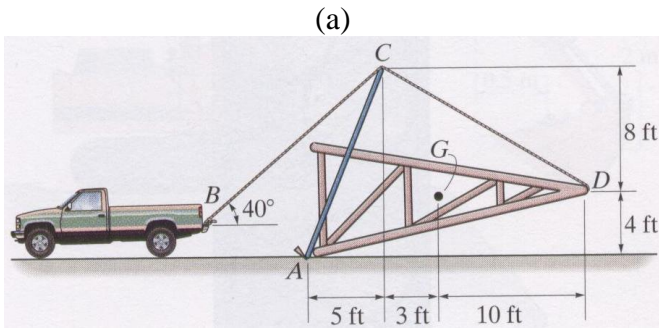
2. (25 points) Determine the moment of inertia for the beam's cross-sectional area about the centroidal x' axis. Each channel has a cross-sectional area of $A_c = 11.8 \text{ in}^2$ and a moment of inertia about a horizontal axis passing through its own centroid, C_c , of $\bar{I}_{x_c} = 349 \text{ in}^4$.



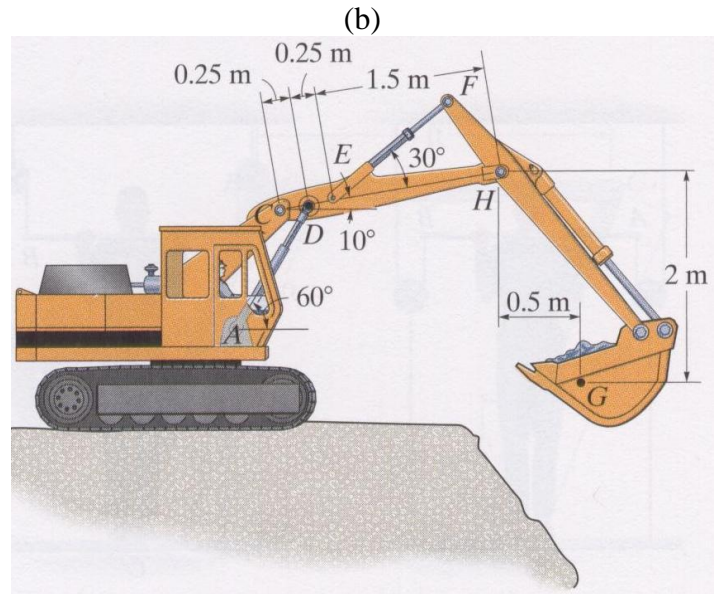
3. (30 points) Determine the moment of inertia of the 14-kg flywheel about the axis L .



4. (5 points each) Draw the free-body diagrams necessary to solve the following situations.

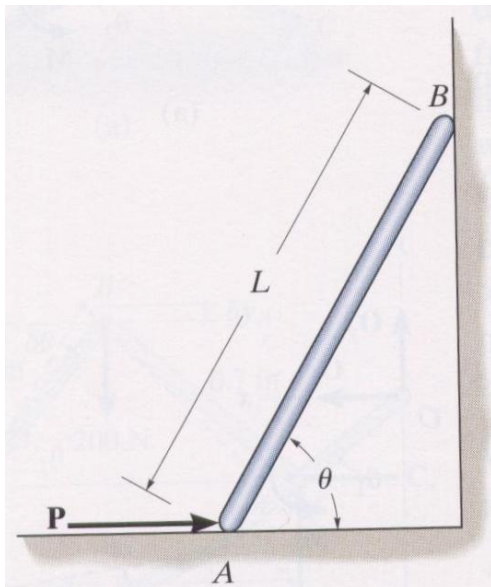


The tower truss has a weight of 575 lb and a center of gravity at G . The rope system is used to hoist it into the vertical position. If rope CB is attached to the top of the shear leg AC and a second rope CD is attached to the truss, determine the required tension in BC to hold the truss in the position shown. The base of the truss and the shear leg bears against the stake at A , which can be considered as a pin. Also, compute the compressive force acting along the shear leg AC .



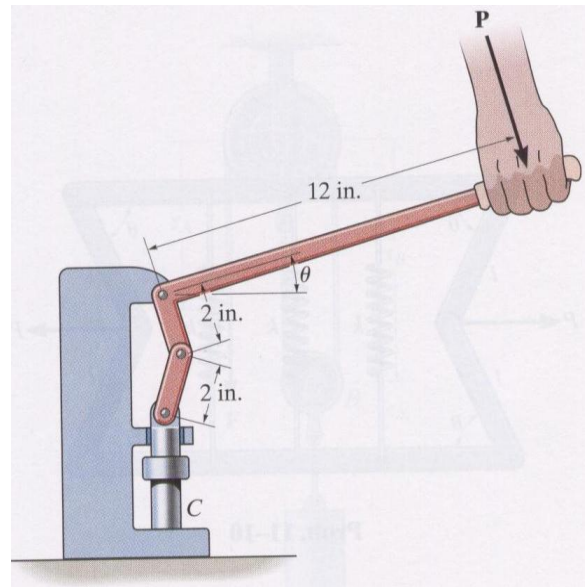
Determine the force created in the hydraulic cylinders EF and AD in order to hold the shovel in equilibrium. The shovel load has a mass of 1.25 Mg and a center of gravity at G . All joints are pin connected.

(c)

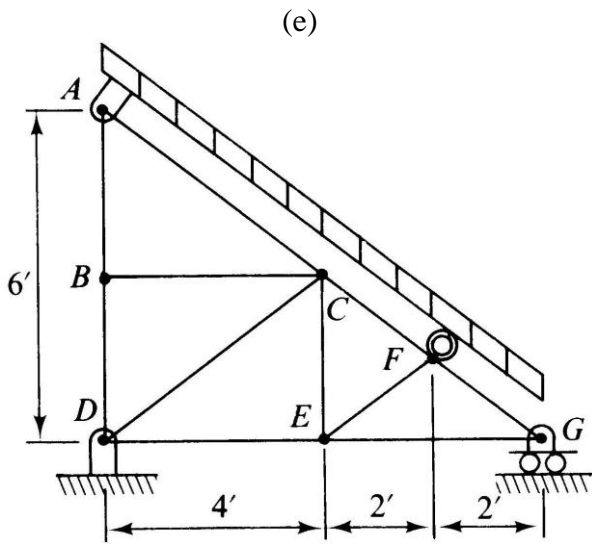


The thin rod of weight W rests against the smooth wall and floor. Determine the magnitude of force P needed to hold it in equilibrium.

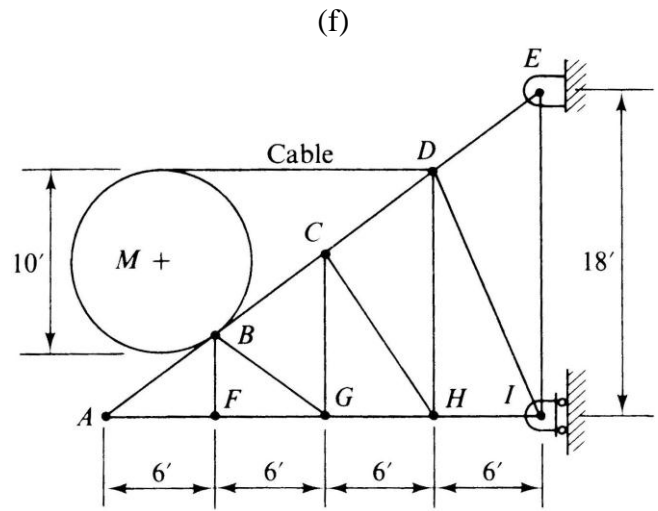
(d)



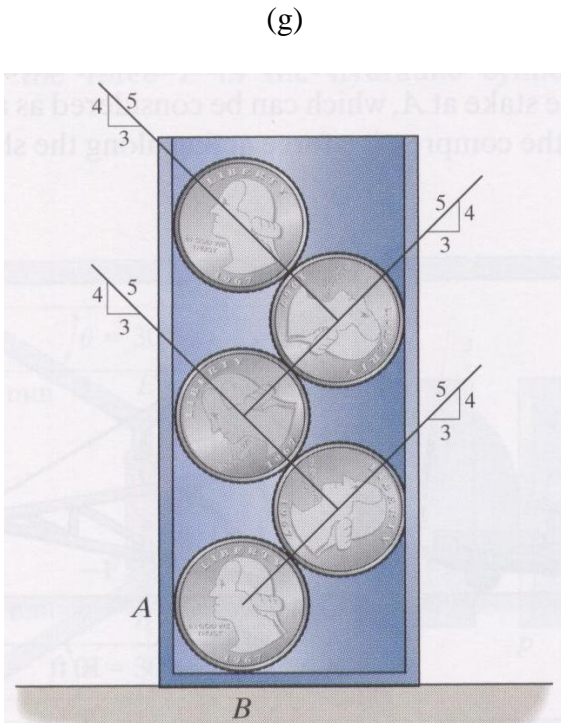
If a force of $P = 30$ lb is applied perpendicular to the handle of the toggle press, determine the compressive force developed at C if $\theta = 30^\circ$.



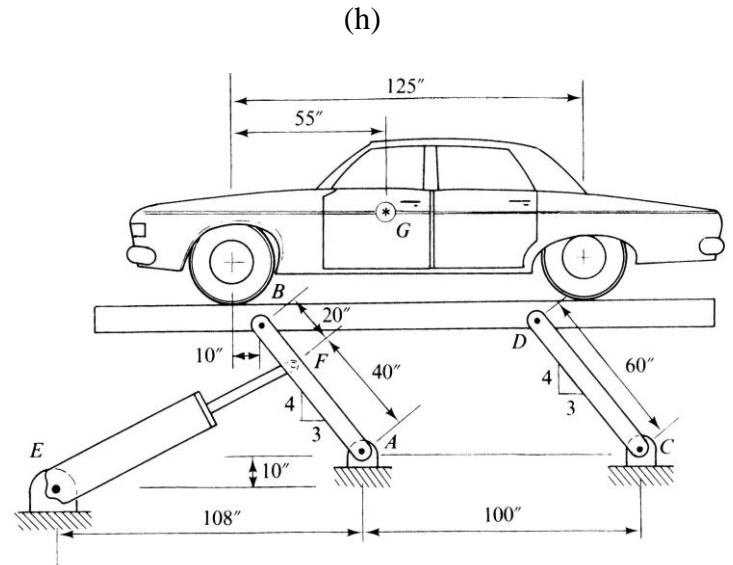
The gravel chute is supported by a truss at points A and F . The chute and contents, when full, weigh 300 lb per running foot. Determine the forces in members CE and EF of the truss.



The 5000-lb drum M is supported by the truss and a cable which is wrapped around the drum and fastened to the truss at B and D . Compute the forces in members BC , GC , and GH using method of sections.



Five coins are stacked in the smooth plastic container shown. If each coin weighs 0.0235 lb, determine the normal reactions of the bottom coin on the container at points A and B .



The hydraulic automobile hoist consists of two identical frames like the one shown. The hydraulic piston is centered between the two frames. A 4000-lb automobile is supported in the position shown (2000 lb on each frame). Determine the force on the piston rod EF on each of the two members AB , and the bearing reaction at A on AB .

