In the name of God

Programming Project for the Statics Course

TUT

The deadline for submitting responses is until 24:00 on the 3rd of Bahman, 1403.

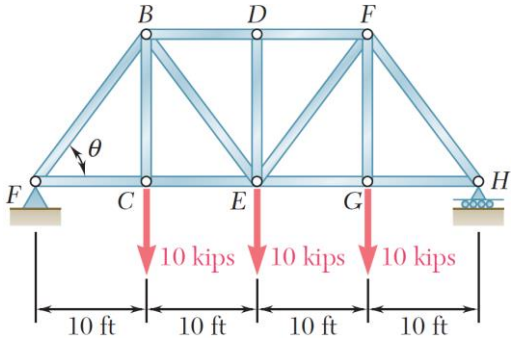
Row

-1

It is required that the truss shown in the figure below be designed to withstand the three 10 kips forces as shown. The maximum stress that the truss members can tolerate is 20 kips/in² (stress is calculated by dividing the force by the cross-sectional area).
The length of the truss is 40 feet:

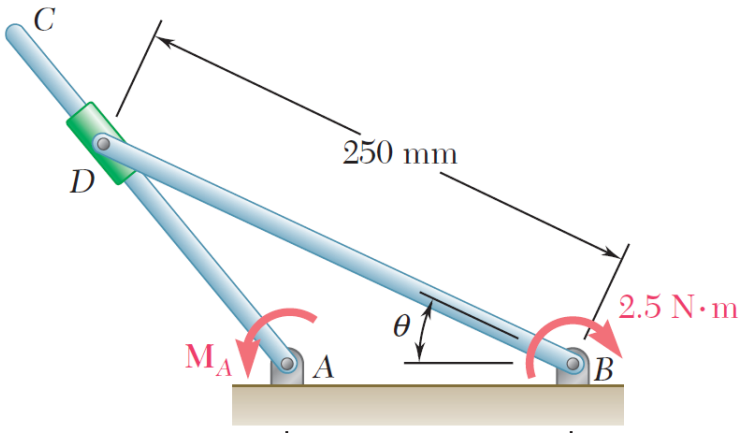
a) If the specific weight of the steel used is 0.284 lb/in³, calculate the weight of the truss and the cross-sectional area of each
member of the truss for variations in the angle Θ from 80 degrees to 5 degrees, decreasing in steps of 5 degrees.

b) Then, by considering smaller variations in the angle Θ at each step, find the optimal value of Θ such that the truss weight and cross-sectional area are minimized, disregarding zero-force members.



-2

Design a robotic system. The two-bar mechanism is shown in the figure. Bars AC and BD are connected by a sliding block D as shown. Neglecting the effect of friction, write a computer program and use it to determine the coupling M_A required to maintain the equilibrium of the bars for values of u from 0 to 120 degrees in steps of 10 degrees. For the same values of u, determine the magnitude of the force F exerted by bar AC on the sliding block.



Good luck - Jafari