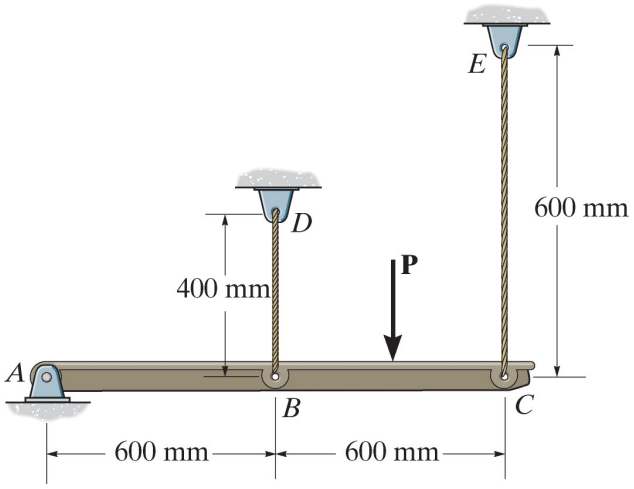
Name:

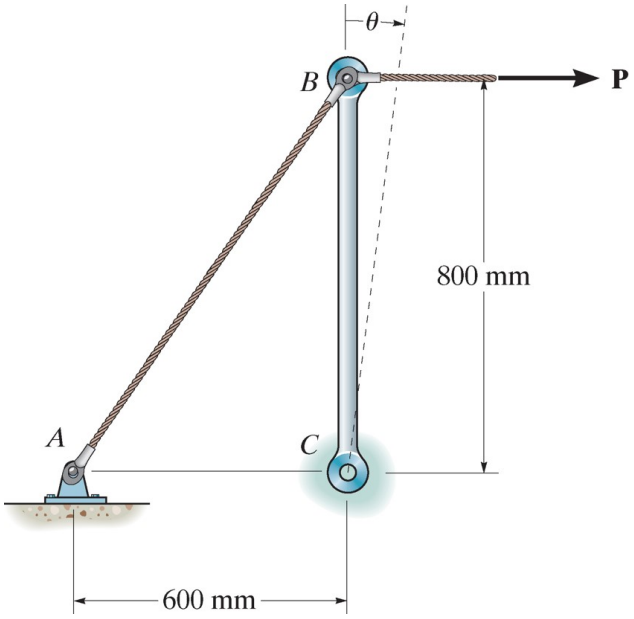
Homework 2

Due 19 Feb 2021

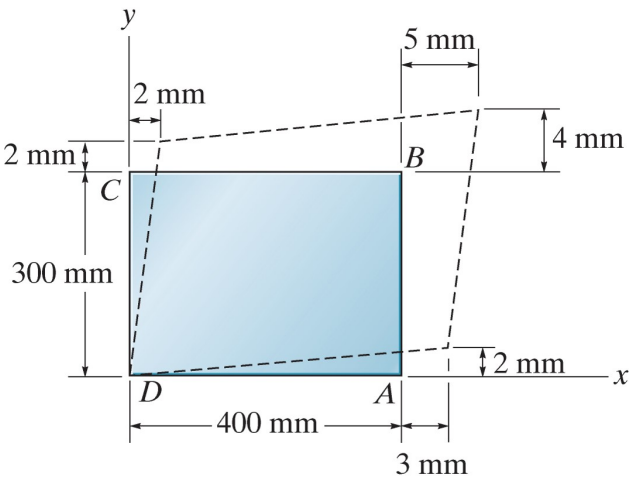
1. If the load shown causes the point C to displace 15 mm find the strain in the ropes BD and CE.



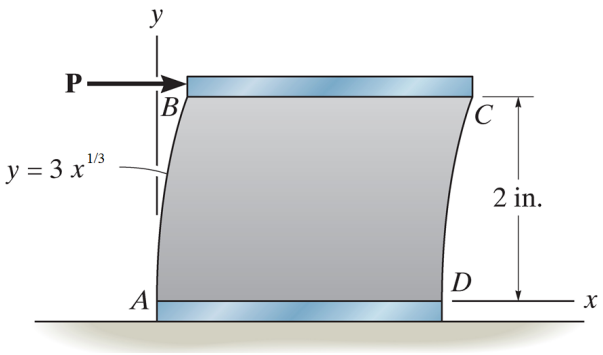
2. A flexible cable, AB, connects to a rigid member CB as part of an airplane control mechanism. A force as shown causes a strain in the cable of $400\mu\epsilon$, find the angle θ that the rigid member rotates due to this strain.



3. Determine the shear strain, γ_{xy} at corners C and D for the plate shown.



4. The polysulfone block is glued at its top and bottom to rigid plates. A tangential force applied to the top plate causes the sides to deform so that they are described by the equation $y = 3x^{1/3}$. Find the shear strain at corners A and B.

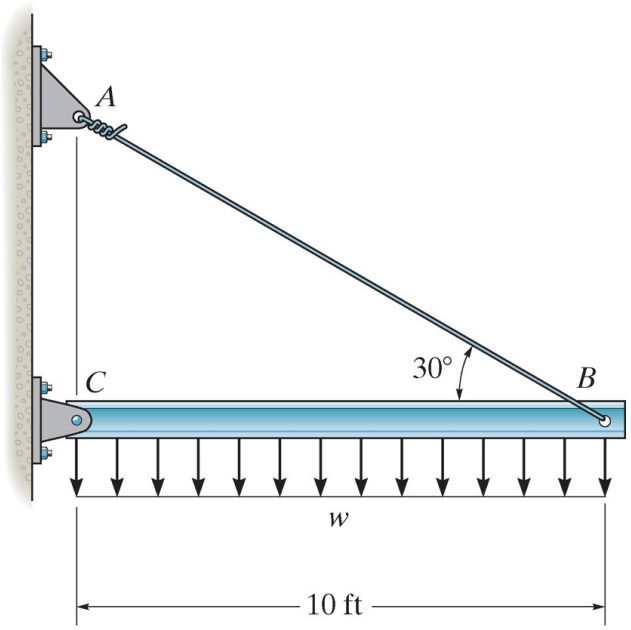


5. A tension test was performed on a steel specimen with a cross-sectional area of 0.5 in and a gage length of 2 in. Plot the stress-strain diagram and find the modulus of elasticity, the yield stress, and the ultimate tensile strength.

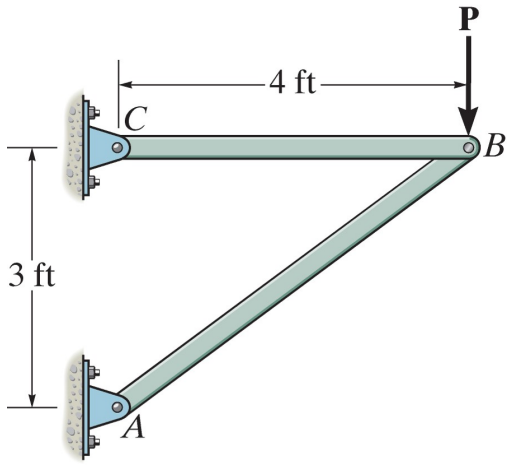
Table 1: tensile test data

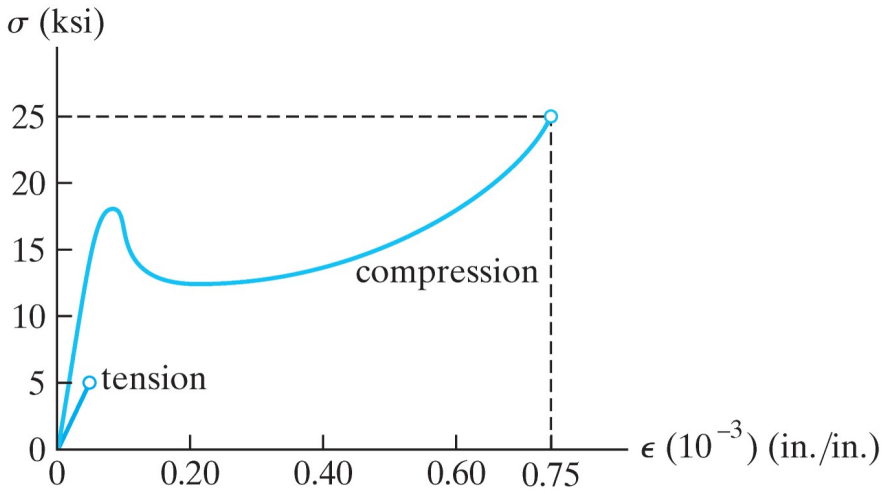
Load (kip)	**Elongation (in)**
0	0
1.50	0.0005
4.60	0.0015
8.00	0.0025
11.00	0.0035
11.80	0.0050
11.80	0.0080
12.00	0.0200
16.60	0.0400
20.00	0.1000
21.50	0.2800
19.50	0.4000
18.50	0.4600

6. The rigid beam shown is supported by a pin at C and an A-36 steel wire AB. If the wire diameter is 0.25 in determine what the load w is when B is displaced 0.50 in downward.



7. The two bars shown are made from the material given in the stress-strain diagram shown. Find the cross-sectional area of each bar such that they fail under the same load P. Neglect any effects from buckling, consider only tensile and compressive failure.





8. Dr. Smith made a rubber band gun for his son. If the gun is 9 in long, compare the strain in 0.5 in, 1 in, and 2 in diameter rubber bands when stretched over the barrel of the gun.