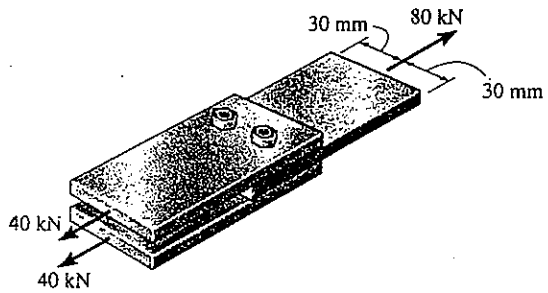
Handout 1

ENGR 321 - Mechanics of Materials – Due Oct. 8, 2008

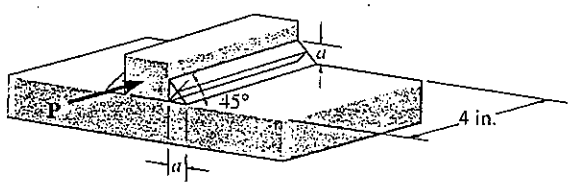
1.



a) The joint is fastened together using two bolts. Determine the required diameter of the bolts if the allowable shear stress for the bolts is $t_{allow} = 110$ MPa. Assume each bolt supports an equal portion of the load.

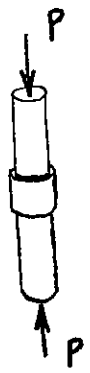
b) Determine the thickness required for the plates (required for normal stress) if they are made of A36 steel, and are to have a factor of safety of 1.6. $\sigma_{failure}$ can be found in the table in the back of your text. In elastic steel design, the yield point is considered failure for tensile and compressive stresses. Determine required thickness to nearest $\frac{1}{2}$ mm.

2



The strength of a fillet weld is determined by computing the average shear stress along the shaded plane, which has the smallest cross section. Determine the smallest size a of the two welds if the force applied to the plate is P = 20 kip. The allowable shear stress for the weld material is τ_{allow} = 14 ksi and the allowable shear stress for the plates is 9 ksi.

3.



The cylindrical rod shown is made of annealed (soft) copper with modulus of elasticity $E = 17 \times 10^3$ ksi and Poisson's ration $\nu = 0.33$, and it has an initial diameter $d_0 = 1.9998$ in. For compressive loads less than a "critical load" P_{cr}, a ring with inside diameter $d_r = 2.0000$ in. is free to slide along the cylindrical rod. What is the value of the critical load P_{cr}?