

ES120 Spring 2018 – Section 1 Notes

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Problem 1:

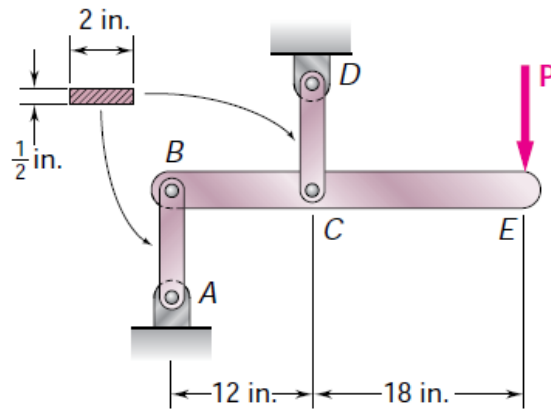
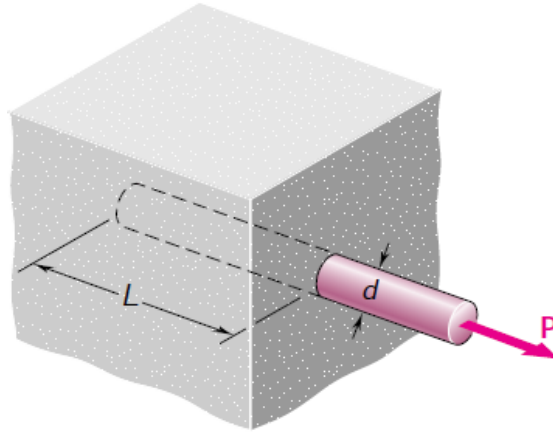


Figure 1

Each of the steel links AB and CD is connected to a support and to member BCE by 1-in.-diameter steel pins acting in single shear. Knowing that the ultimate shearing stress is 30 ksi for the steel used in the pins and that the ultimate normal stress is 70 ksi for the steel used in the links, determine the allowable load P if an overall factor of safety of 3.0 is desired. (Note that the links are not reinforced around the pin holes.)

Problem 2:**Figure 2**

A force P is applied as shown to a steel reinforcing bar that has been embedded in a block of concrete. Determine the smallest length L for which the full allowable normal stress in the bar can be developed. Express the result in terms of the diameter d of the bar, the allowable normal stress σ_{all} in the steel, and the average allowable bond stress τ_{all} between the concrete and the cylindrical surface of the bar. (Neglect the normal stresses between the concrete and the end of the bar.)