1. A short timber post supports an axial load 10,000 lb. from a floor beam. The post is a Douglas fir-larch 6x6 S4S, with actual cross-sectional dimensions of 5.5"x5.5".
   a. What is the axial compressive force that develops in the post? 
      ______________ 
   b. What is the minimum grade of Douglas fir-larch that could be used for this post based on the table in the book? ____________

2. A short 8x8 S4S timber post carries a load of P=1800 lb. without the use of a footing.
   a. What is the force, lb/in², exerted on the soil? ___________
   b. Does this exceed the allowable bearing pressure? __________

3. Determine the maximum load capacity, P; of a stud wall if the allowable capacities in the following lumber species (use the book tables for allowable values). Make sure you use actual sizes of lumber:
   a. Southern Pine-Stud grade: 
      __________
   b. Hemlock-fir (Hem-Fir)-Stud grade: 
      __________
4. A steel column carries a building load of 75k to a 14"x14" base plate which is bolted to a concrete footing pad that measures 1-foot in thickness. Determine the following:
   a. What is the average compressive stress developed in the W8x40 column? _________________
   b. What is the bearing stress between the steel base plate and the concrete footing? _________________
   c. What is the required footing size, assuming the allowable soil bearing pressure is q=4ksf and the weight of the concrete is 150 psf? ____________

5. A steel rod with a diameter of 15mm supports a weight equal to 6kN. What is the average unit tensile stress developed in the rod? _________________

6. A plywood fabricator uses the arrangement shown to determine the shear strength of a glued joint. If P=3000 lb at failure, what is the unit shearing stress that develops between the plywood pieces? ____________
7. Based on the diagram to the right:
   a. What is the stress developed in the bolts shown in the lap splice if the applied load is \( P = 8 \text{k} \)?

   b. The maximum shear stress that the bolts are capable of safely resisting is equal to 14.5 ksi. Are the bolts safe?

8. A 4x6 S$S$ lower chord member in a timber roof truss must be spiced using two, 2x6 S$S$ members on either side with 2-1/2” Ø bolts on each half.
   a. What is the maximum capacity of the connection based on shear stress in the bolts (\( F_v = 10 \text{ksi} \))?

   b. What is the bearing stress between the bolts and the wood members? (\( F_c = 1000 \text{lb/in}^2 \) in the wood members)

   **Note:** Analyze the connection on either side of the section cut/splice. The bearing area of the bolts on the wood member is computes as:
   \( \text{(no of bolts)} \times \text{(bolt diameter)} \times \text{(critical length of bolt)} \)

9. A steel seat angle supports a beam load \( P \) using 2-7/8”Ø high strength bolts (A325 with an allowable shear stress capacity \( F_v = 17 \text{ ksi} \)). What is the maximum permissible load \( P \)?
10. A pipe storage rack is used for storing pipe in a shop. The support rack beam is fastened to the main floor beam using steel straps ½”x2”. Round bolts are used to fasten the strap to the floor beam in single shear.
   a. If the weight of the pipes impose a maximum tension load of 10,000 pounds in each strap, what is the tension stress developed in the steel strap? 

   b. What diameter bolt is necessary to fasten the strap to the floor beam if the allowable shear stress for the bolts equals $F_v=15,000$ lb/in²? 