Structures Homework Set 2
Due in class on October 9

1. Provide two examples each of objects undergoing deformation from compression, tension, and shear (that’s a total of six examples).

2. What shape is the only stable hinged polygon? What shapes are not stable? Give examples. Explain why they are or are not stable. Use diagrams if it aids your explanation.

3. Select the figure that shows a cable with the most horizontal thrust. Explain why the horizontal thrust is larger for your selection. The load is 5 lbs, the length of each cables is 5 feet, and the angle between the wires is 60° for (a) and 90° for (b).

   (a) \hspace{1cm} (b)

4. Where have you seen trusses, cable-stayed structures, and geodesic domes in your daily life? Give an example, including a sketch (or picture!).

5. Consider an aluminum cube 6” on a side. Take the modulus of elasticity for aluminum to be 10,000,000 psi and its ultimate compressive strength to be 2,175 psi.
   a) How much weight could you place on top of this cube before you crushed it?
   b) How much would the cube have compressed (i.e. how tall was it) just before it was crushed?

6. A steel cable 1/8” radius can support a weight of 2500 pounds without snapping. From this fact, determine how thick a cable is needed to support a weight of 250,000 pounds.

7. An 75-pound bag of cement is suspended eight feet below a beam by two wires of unequal lengths, as shown. What is the tension in each wire?