Text problems: 4.6, 4.27

Bonus (15 pts): Prove that the max shear stress at the neutral axis, for a circular cross section, can be correctly computed using \( Q = A^*\bar{y}^* \).

Non-text problems:

1. You want to design a thin-walled spherical tank to hold gases for a chemical reaction. The gases are held in this tank at a pressure of 500 psi. You need to hold 100 ft\(^3\) of these gases. What are the radius and thickness of the tank if the material has a yield stress of \( \sigma_y = 30 \text{ ksi} \)? Remember that \( r_o \approx r_i \approx r \). Use a factor of safety of 2.

2. For the system in figure 1, determine the following:
   (a) The diameter required in the circular section of the torsional member.
   (b) The values of \( b \) and \( h \) in the right part of the torsional member, assuming that \( b = h \).

Both sections consist of the same material with \( \tau_{max} = 30 \text{ ksi} \)

![Figure 1: Two-sectioned torsional member](image)