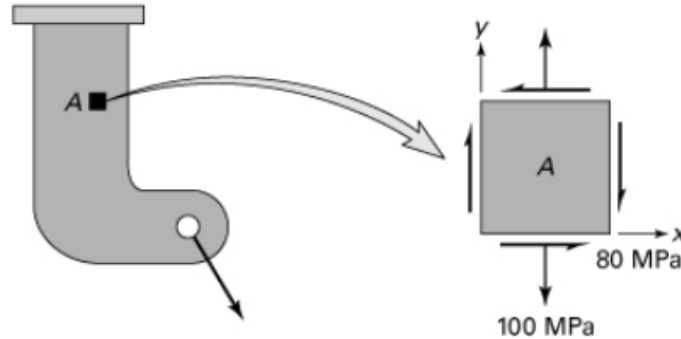# Homework 4

1) At a critical point in a loaded ASTM-A36 structural steel bracket, the plane stresses have the magnitudes and directions depicted on element A. Calculate whether the loadings will cause the shaft to fail, based on a safety factor of $n = 1.5$, applying (a) the maximum shear stress theory; (b) the maximum energy of distortion theory.

2) A simply supported nonmetallic beam of 0.25-m height, 0.1-m width, and 1.5-m span is subjected to a uniform loading of $6 \; kN/m$. Determine the factor of safety for this loading according to (a) the maximum distortion energy theory and (b) the maximum shearing stress theory. Use $\sigma_{yp} = 28 \; MPa$.

3) A thin-walled cylindrical pressure vessel of diameter $d = 0.5 \; m$ and wall thickness $t = 5 \; mm$ is fabricated of a material with 280-MPa tensile yield strength. Determine the allowable internal pressure p according to the following theories of failure: (a) maximum distortion energy and (b) maximum shear stress.