CVG2140 – Assignment No. 8 (Combined Stresses)

(Due Date: Friday, April 10th, 2015)

Problem 1. Determine the principal stresses and their directions at the surface point C of the solid cylinder shown in Fig. 1 (diameter = 50 mm, length = 250 mm) subjected to an axial force *P* and torque *T*.

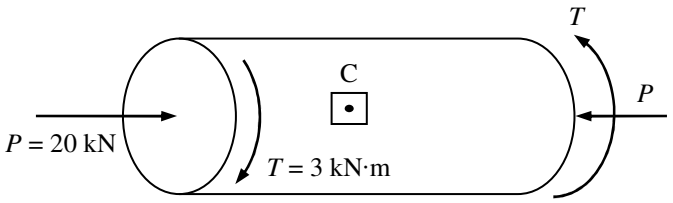

Fig. 1

Problem 2. Determine the principal stresses and their directions at three surface locations, *A*, *B*, and *C*, of the brass cantilever beam with rectangular cross-section shown in Fig. 2. The beam is subjected to its own weight as well as a concentrated load of 12 kN at its free end. The material properties of brass are as follows: density $\rho = 8500$ kg/m^3, Young's modulus $E = 100$ GPa, and yield stress $\sigma_y = 450$ MPa.

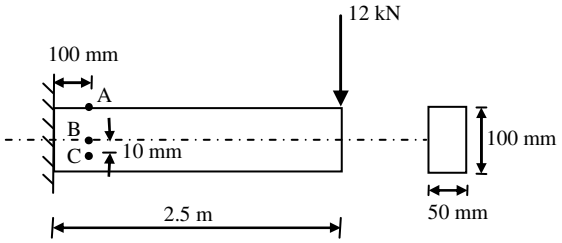

Fig. 2

Problem 3. The state of stress at a point is shown in Fig. 3. By using Mohr's circle, determine:

a) The principal stresses and their orientation;

b) The maximum in-plane shear stress and average normal stress, specifying the corresponding orientation; and,

c) The equivalent state of stress if the coordinate system is oriented 30º clockwise from the element shown in Fig. 3.

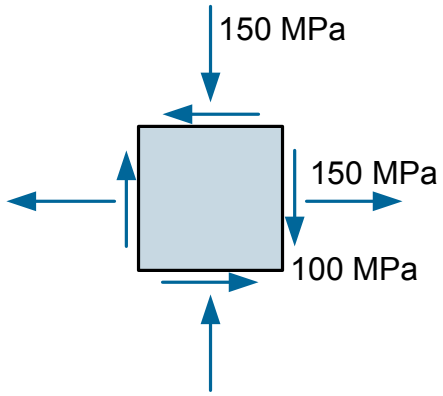

Fig. 3