CIVIL ENGINEERING DEPARTMENT

CE 203 STRUCTURAL MECHANICS I

Second Semester 1433 / 2012 (**112**)

HOMEWORK NO. 14

- **Textbook Sections Covered:** Chapter 9 (Transformation of Stress)
- **DUE DATE**: **Monday 14 - May - 2012**

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1 - The given tube has an outer diameter = 60 mm and an inner diameter = 50 mm.

   a) Determine the state of stress at point B , which is located on the outer surface (Use Ch. 8)

   b) Using the results of (a), *use transformation equations* to determine the principal normal stresses and their orientation. Show results on an element.
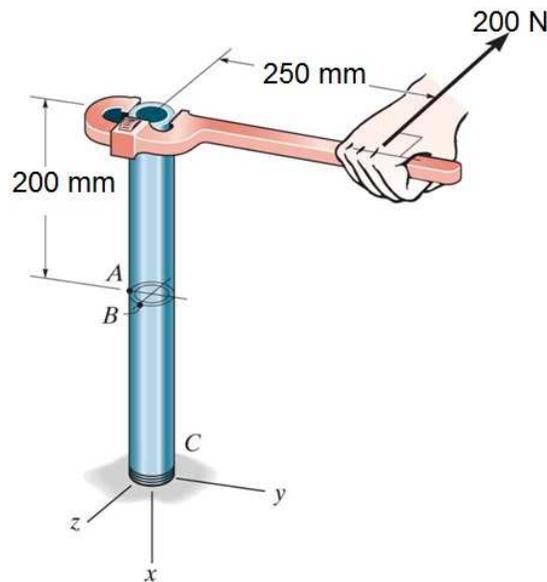
2- A square plate (thickness = 20 mm) is subjected to the given loads. *Use Transformation equations*, to determine the normal and shear stresses acting on plane AB. Show the results on an element
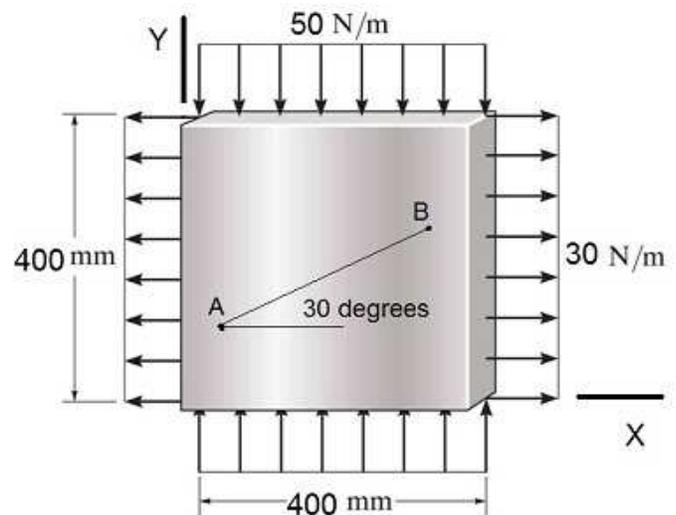
3- Using the element shown below: i) determine the equivalent state of stress if the element is rotated by 20 degrees clockwise, ii) determine the principal stresses and orientation, iii) determine the maximum shear stress and orientation. Show the result of each part on a properly-oriented element. *Use the transformation equations.*

700 kPa

200 kPa

300 kPa
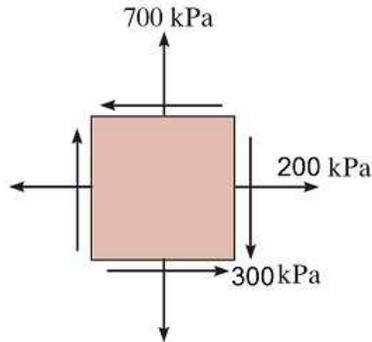
4 - Repeat Problem 3 above but: *Use Mohr's Circle.*

5- Using the element shown below: i) determine the equivalent state of stress if the element is rotated by 55 degrees counterclockwise, ii) determine the principal stresses and orientation, iii) determine the maximum shear stress and orientation. Show the result of each part on a properly-oriented element. *Use Mohr's Circle.*

80 MPa

50 MPa

60 MPa