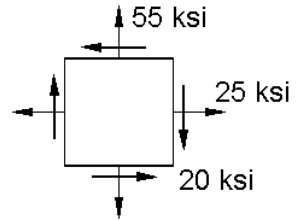# BE 110 - Mechanics of Materials - Fall 2003

Name:

Exam 3 –Stress and Strain

Section: C

1. Determine the principal stresses and maximum in-plane shearing stress for the state of plane stress shown. Show their orientations on appropriate sketches. Also determine the magnitude of the absolute maximum shear stress at the point.
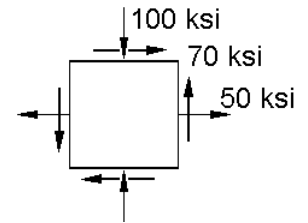
2. An element on the surface of a magnesium rod ($E = 6.5 \times 10^6$ psi, $G = 2.5 \times 10^6$ psi, $\nu = 0.29$) is subjected to the stresses shown. Determine and show the **strains** on an element rotated 30° counterclockwise.
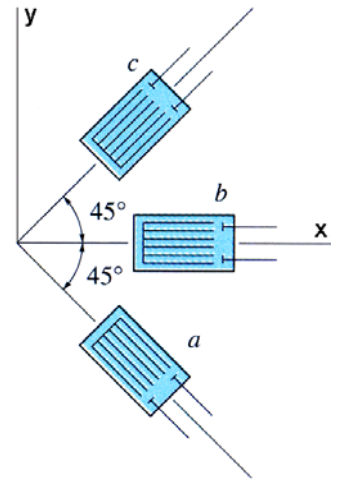
100 ksi

70 ksi

50 ksi

3. The strain gages have readings $\varepsilon_a = 300\mu$, $\varepsilon_b = 180\mu$, and $\varepsilon_c = -250\mu$. Determine ε_x, ε_y, and γ_{xy}. (No sketch required.)

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4. The thin-walled pipe has an inner diameter of 0.5 in. and a wall thickness of 0.025 in. If it is subjected to an internal pressure of 500 psi and the axial tension and torsional loadings shown, determine and sketch the state of stress on element A.