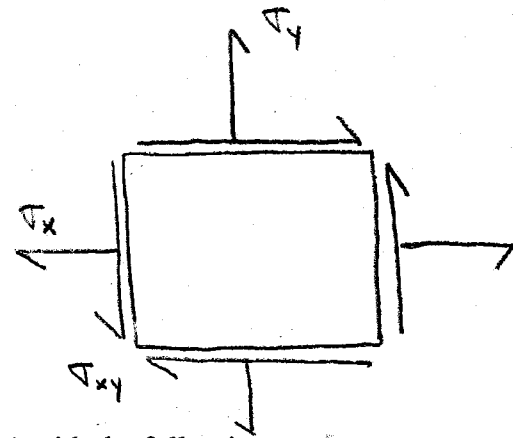


MAE 415 – Analysis of Structures
Instructors: Bloebaum/Hulme
Assignment #1
Due date: 9/8/00, BEFORE class begins

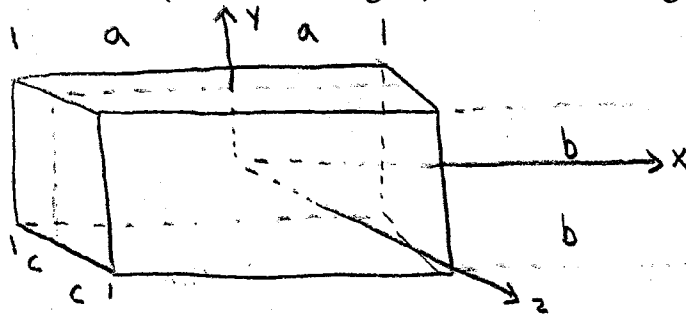
1. Given: A state of plane stress with known principal stress:

$$\sigma_y = 80 \text{ MPa}; \sigma_{xy} = -100 \text{ MPa}; \sigma_I = 121.4 \text{ MPa}$$

Find: Unknown σ_x and the θ corresponding to σ_I .



2. Given: A rectangular piece of sheet metal (shown in the figure) with the following dimensions: $2a \times 2b \times 2c$.



Find: Direction cosines of the normals to the 3 visible surfaces ($x = -a$, $y = b$, $z = c$) with respect to each cartesian coordinate.

3. Given: The stress states below for 9 cases:

Case	σ_x	σ_y	σ_z	σ_{xy}	σ_{xz}	σ_{yz}	Units
1	-120	80	0	-100	0	0	MPa
2	-18	6	0	9	0	0	ksi
3	0	24	10	5	0	0	ksi
4	10	0	-8	-8.660	0	0	ksi
5	200	0	-90	173.205	0	0	MPa
6	70	70	70	0	0	0	MPa
7	100	20	-50	90	0	0	MPa
8	40	40	0	-45	0	0	MPa
9	-32	16	-12	10	0	0	MPa

Find: a) Mohr's circle for each case, b) rotated differential elements, c) overall maximum shear stresses

Note: class web page: <http://www.eng.buffalo.edu/~clb/mae415.html>