

ME 1028 (06-1)

HW#6

Due on Friday, Oct. 28th

Name

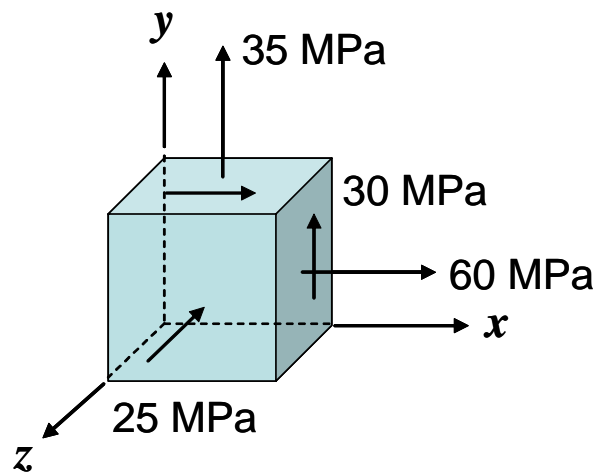
(1) At a critical point in a loaded machine component, the stresses relative to x, y, z coordinate system are given by

$$\begin{bmatrix} 60 & 20 & 20 \\ 20 & 0 & 40 \\ 20 & 40 & 0 \end{bmatrix} \text{ MPa}$$

Use CAE tools (Hand-writing solution will not be accepted) to determine the principal stresses $\sigma_1, \sigma_2,$ and $\sigma_3,$ and the orientation of σ_1 with respect to the original coordinate axes.

(2) Figure shown below depicts a point machine base based subjected to the three-dimensional stresses. Use CAE tools (Hand-writing solution will not be accepted) to determine at the point

- (a) The principal stresses
- (b) The maximum shear stress
- (c) The angle through which the element should rotate about the z -axis
- (d) The octahedral normal and shear stresses



(3) Calculate the largest load P that may be carried by a relatively brittle flat bar consisting of two portions, both 12-mm thick, and respectively 30-mm and 45-mm wide, connected by fillets of radius $r = 6$ mm (see Appendix C.1).

Given: $S_y = 210$ MPa and a factor of safety of $n = 1.5$.