HOMEWORK PROBLEM

a. Given the expressions for strains in terms of stress,

$$\varepsilon_x = \frac{1}{E} \cdot \left[\sigma_x - \nu \left(\sigma_y + \sigma_z \right) \right]$$

$$\varepsilon_y = \frac{1}{E} \cdot \left[\sigma_y - \nu \left(\sigma_x + \sigma_z \right) \right]$$

$$\varepsilon_z = \frac{1}{E} \cdot \left[\sigma_z - \nu \left(\sigma_y + \sigma_x \right) \right]$$

Derive the expressions for stress in terms of strains.

b. Derive the expression for the strain in terms of stress for the cases of plane stress ($\sigma_z = \tau_{xz} = \tau_{yz} = 0$) and plane strain ($\varepsilon_z = \gamma_{xz} = \gamma_{yz} = 0$).

c. Derive the expression for the stress in terms of strain for the cases of plane stress ($\sigma_z = \tau_{xz} = \tau_{yz} = 0$) and plane strain ($\varepsilon_z = \gamma_{xz} = \gamma_{yz} = 0$) .