Tutorial -3

(1) The state of strain at a point w.r.t $x-y-z$ coordinate system in a deformed solid is given by $\epsilon_x = 1 \times 10^{-6}$, $\epsilon_y = 0$, $\epsilon_z = 3 \times 10^{-6}$, $\gamma_{xy} = 0$ $\gamma_{xz} = 0$, $\gamma_{yz} = 4 \times 10^{-6}$. The solid is homogenous & isotropic. Its youngs modulus & poissons ratio are $E = 200 \, GPa$, $\nu = 0.3$

(a) determine the principal strain and principal stress

(b) determine the state of stress at the point w.r.t to $x-y-z$ coordinate system

(2) The displacement field in a deformed solid is given by $u = (3x^2 y + 6) \times 10^{-2}$, $v = (6xz + y^2) \times 10^{-2}$ $w = (6z^2 + 2yz + 10) \times 10^{-2}$, Calculate the linear strains at a point $(1, 0, 2)$ and calculate the longitudinal strain at the point along the line.

$$2x + \sqrt{3} y \bullet -3z + 4 = 0$$

(3) show that the plane strain elastic constants are larger than the plane stress elastic constants.