Tutorial-2

① Relative to XYZ coordinate systems a state of stress at a point is given by

$$\sigma = \begin{bmatrix} 30 & 20 & -20 \\ 20 & 10 & -10 \\ -20 & -10 & 0 \end{bmatrix}$$

determine the principal stresses and the principal plane for σ_3. Also determine the maximum shear stress and octahedral stresses

② At a given point of a body the principal stresses and principal direction w.r.t coordinate system are given by

$$\sigma_1 = 4 \;,\; \sigma_2 = 2,\; \sigma_3 = 1$$

$$\hat{n} = \frac{1}{\sqrt{2}}(j - k) \;,\; \hat{m} = \frac{1}{\sqrt{2}}(j + k)$$

determine the state of stress at the point w.r.t xyz coordinate system $\hat{i}, \hat{j}, \hat{k}$ are unit vectors along x, y, z direction, respectively

③ The stress components at a point in a given by are given $\sigma_x = ax + by^2 + cx^3$

$$\sigma_y = dx + ey^2 + fx^3$$

$$\sigma_z = gx + hy^2 + kz^3$$

$$\sigma_{xy} = l + mz$$

$$\sigma_{yz} = my + pz$$

$$\sigma_{xz} = qx^2 + sz^2$$

where a, b, c, e, f, g ... are constants. If the body is in the equilibrium and the body couples are absent determine the body force.