1. From the book: 4.11, 5.50, 5.55, 5.62, 5.92

2. A homogeneous plate $ABCD$ (See Figure 3) is subjected to a biaxial loading which results in the normal stresses $\sigma_x = 150\, MPa$ and $\sigma_y = 100\, MPa$. Knowing that the plate is made of steel for which $E = 200\, GPa$ and the Poisson's ratio $\nu = 0.30$, determine the change in length of (a) edge AB, (b) edge BC, and (c) diagonal AC.

![Figure 1: A plate ABCD under stresses](image)

3. A long rod hanging vertically in a well supports a load $P$ at its lower end as shown in Figure 2. The material has the bilinear stress-strain curve shown in the figure, in which $E_1$ and $E_2$ represent the slopes of the two parts of the diagram. Find the elongation $\delta$ of the bar due to its own weight and the force $P$ if the unit weight $\gamma = 28\, kN/m^3$, the cross-sectional area $A = 960\, mm^2$, the length $L = 360\, m$, and the load $P = 92\, kN$. 
4. A bimetallic bar consisting of a copper core securely bonded to two steel stripes is heated uniformly by an amount $\Delta T$. Assuming that the width of the bar is $b$, the length is $L$, and the thickness of each layer is $t$, determine the stress $\sigma_s$ and $\sigma_c$ in the steel and copper, respectively. Also, draw free-body diagrams of each of the three strips. (Note: Coefficients of thermal expansion for steel and copper are $\alpha_c > \alpha_s$. Moduli of elasticity are $E_s$ and $E_c$.)

![Figure 3: Diagrams for problem 5](image)

This Problem Set is worth 36 points.