A. Consider a rectangular column subjected to axial compression. The material stress-strain relationships have been idealized as shown below.

1. Determine the stress in the concrete and stress in the steel if the applied load is equal to 1,750 kips.  

2. Determine the stress in the concrete and stress in the steel if the applied load is equal to 2,250 kips.  

3. Determine the maximum axial load that can be supported by the column (Ultimate Strength according to ACI).  
   \[ P_n = ? \text{ and } P_u = ? \]
B. Do the following for the column described below:

Assume the column to be spiral column with the spiral properties given and calculate the loads right before spalling of concrete shell and after spalling of concrete shell. Does the spiral satisfy the code for minimum spiral ratio (Eq. 10-6 of ACI).

Longitudinal reinforcement 6#9 bars, \( f_y = 50 \text{ ksi} \);
Spiral diameter 1/4 inch, with 1.5 inch spacing;
\( f_{ys} \) (yield stress for spiral reinforcement) = 70 ksi;
\( f'_{c} = 4,000 \text{ psi} \).

Answer: \( P_A = \text{kips} \)
\( P_B = \text{kips} \)

C. Design a spiral column and a tied column to carry a dead load of 410 kips and a live load of 400 kips. The given loads are axial loads. Use 4000 psi concrete and 60,000 psi steel. Detail your designs.