Given: 4 boards each 1" x 6" glued and nailed as a column section.

A) Determine arrangement for the strongest section.

B) Determine allowable axial load for:
   \[ L = 10' - 0" \quad 20' - 8" \quad 30' - 0" \]
   Braced at ends only

\[ E = 176,000 \text{ psi} \]
\[ f_c = 1800 \text{ psi} \]
\[ f_c = \frac{3.60E}{(8r)^2} \quad \frac{f_c}{f_{c1}} \leq 170 \]

Placing the material as far as possible from the N.A.,

\[ A = 4(6) = 24 \]
\[ I_x = I_y = \frac{7(7)^3}{12} - \frac{5(5)^3}{12} = 148.0 \]
\[ r = \frac{\sqrt{148}}{24} = 2.483 \]

\[ P = \frac{3.6E}{(8r)^2} = \frac{3.6(1760000)}{4^2(2.483)^2} = \frac{1}{4^2} \left( \frac{39072000}{9} \right) = \frac{P}{A} \]

\[ P = \frac{1}{4^2} (937728000) \approx 1165120 \text{ lbs} \]

For \( L = 10' - 0" \):
\[ \frac{P}{f_c} = \frac{48.4}{120} = 0.4 \quad \text{OK} \]
\[ P = \frac{1}{120^2} (937728000) = 65.120 \text{ lbs} \]
\[ P_{cr} = 1800(24) = 43,200 \text{ lbs} \]

For \( L = 20' - 8" \):
\[ \frac{P}{f} = \frac{100}{248} = 0.4 \quad \text{OK} \]
\[ P_{cr} = \frac{1}{248^2} (937728000) = 15246 \text{ lbs} < 43200 \]

For \( L = 30' - 0" \):
\[ \frac{P}{f} = \frac{145.2}{248} = 0.6 \quad \text{OK} \]
\[ P_{cr} = \frac{1}{360^2} (937728000) = 7235 \text{ lbs} < 43200 \]