Problem 1:

a) \[ n = m + r - 2j = 14 + 3 - 2 	imes 9 = -1 \] (0.25)

Counter example: \( F_l \times F = 0 \rightarrow F = 0 \) : not true.

b) Complex truss

External: stable (0.25)
Internal: Stable (0.25)

\[ n = m + r - 2j = 8 + 4 \times 2 - 2 \times 8 = 0 \] (0.25)

6 method: \( S' \) should be zero based on zero force method. (0.25)

Consider equilibrium at joint B, this requires \( S = 0 \).
\[ \sum M_C = 0 \rightarrow P \times 2 \alpha - F_{HG} \times \alpha = 0 \]

\[ \rightarrow F_{HG} = 2P \quad (0.5) \]

\[ \sum M_E = 0 \rightarrow F_{CH} \times \ell = 0 \rightarrow F_{CH} = 0 \quad (0.5) \]

\[ F_A^y = wL/2, \quad F_D^y = wL/2 \quad (0.5) \]

\[ F_A^x = 0. \]

AB & CD: V = 0, M = 0

BC: \[ \begin{align*}
V &= wL^2 - wx \\
M &= \frac{wL}{2} \cdot x - \frac{wx^2}{2}
\end{align*} \quad (0.5) \]
shear

\[ \frac{wL^2}{2} \]

\[ \frac{wL^2}{2} \]

\[ L \]

\[ L \]

\[ P \]

\[ P \]

\[ P \]

\[ P \]

\[ P \]

\[ F_A = 2P \]

\[ M_A = 2Pl \]

\[ F_y = -P \]

\[ 2P \]

\[ 2P \]

\[ -2P \]

\[ (0.5) \]

\[ (0.25) \]