1. Show that the canonical Hartree-Fock equations can be expressed in terms of spatial orbitals as follows.

$$\hat{f}_\alpha \phi_{p_\alpha} = \epsilon_{p_\alpha} \phi_{p_\alpha} \qquad \hat{f}_\alpha = \hat{h} + \sum_{i_\alpha}^{n_\alpha} (\hat{J}_{i_\alpha} - \hat{K}_{i_\alpha}) + \sum_{i_\beta}^{n_\beta} \hat{J}_{i_\beta}$$

$$\hat{f}_\beta \phi_{p_\beta} = \epsilon_{p_\beta} \phi_{p_\beta} \qquad \hat{f}_\beta = \hat{h} + \sum_{i_\alpha}^{n_\alpha} \hat{J}_{i_\alpha} + \sum_{i_\beta}^{n_\beta} (\hat{J}_{i_\beta} - \hat{K}_{i_\beta})$$

2. Expand the spatial orbitals in problem 1. as $\phi_{p_\omega} = \sum_\nu \chi_\nu \, C_{\nu p_\omega}$ and project each equation by χ_μ in order to arrive at the Pople-Nesbet equations.

3. Write out a complete algorithm for solving the Pople-Nesbet equations.