12. Show that $\langle \Phi_i^a | \sum_i \sum_{j>i} \frac{1}{r_{ij}} | \Phi_0 \rangle$

$$= \langle \Phi_i^a | \sum_j (\hat{J}_j - \hat{K}_j) | \Phi_0 \rangle$$

$\Phi_0 = | \phi_1 \phi_2 \cdots \phi_n |$ where $\phi_1, \phi_2 \cdots$ are spin-orbitals

L.H.S. $= \sum_{j \neq i,a} \{ \langle \phi_i(1) \phi_j(2) | \frac{1}{r_{12}} | \phi_a(1) \phi_j(2) \rangle - \langle \phi_i(1) \phi_j(2) | \frac{1}{r_{12}} | \phi_j(1) \phi_a(2) \rangle \}$

(Slater-Condon rules for 2-e operator for determinants differing by one spin-orbital)

$= \sum_j \{ \langle \phi_i(1) | \hat{J}_j(1) | \phi_a(1) \rangle - \langle \phi_i(1) | \hat{K}_j(1) | \phi_a(1) \rangle \}$

(Check using definition of $\hat{J}_j$ and $\hat{K}_j$)

$= \langle \Phi_i^a | \sum_j (\hat{J}_j - \hat{K}_j) | \Phi_0 \rangle$

(Slater-Condon rule for 1-e operator for determinants differing by one spin-orbital)

= R.H.S.