

These problems will be collected in class on Nov. 16.

1. Prove:

(a)

$$\left\langle 0_c \left| \sum_{ij} (\Delta V)_{ij} : a_i^\dagger a_j :: a_m^\dagger a_a : \right| 0_c \right\rangle = (\Delta V)_{am}$$

(b)

$$\left\langle 0_c \left| \frac{1}{2} \sum_{ijkl} g_{ijkl} : a_i^\dagger a_j^\dagger a_l a_k :: a_m^\dagger a_n^\dagger a_b a_a : \right| 0_c \right\rangle = \tilde{g}_{abmn}$$

2. Prove:

(a)

$$\sum_{\substack{m_a m_b m_m m_n \\ \sigma_a \sigma_b \sigma_m \sigma_n}} g_{abnm} g_{mnab} = 2 \sum_{l,k} \left\{ \begin{array}{ccc} l_a & l_m & l \\ l_b & l_n & k \end{array} \right\} X_k(nmab) X_l(mnab)$$

(b)

$$\sum_{\substack{m_a m_b m_m m_n \\ \sigma_a \sigma_b \sigma_m \sigma_n}} g_{abmn} g_{mnab} = 4 \sum_l \frac{1}{[l]} X_l(mnab) X_l(mnab)$$