PROBLEMS III.

1. Find the value of the 3-j symbol that transforms the function of coupled momenta

$$| (j0)jj>$$

into the function of uncoupled momenta

$$|jj> |00> (= |jj00>)$$

Hint: use operators j_z , j^2 , and the general relation

$$J^2 = 1/2 \{J_+ J_- + J_- J_+\} + J_z^2$$

2. Express the functions of the coupled momenta $|(j_1 j_2) jm>$ in the terms of functions of uncoupled momenta $|j_1 m_1, j_2 m_2>$:

$|(11)21>$

$|(13)22>$

Using the shift operators evaluate appropriate 3-j symbols (without using tables or "calculators"); use the phase convention for which the coupling coefficients are real.