If the general angular momentum quantum number j is 1 there is a triplet of states:

In this case a matrix representation for the operators can be constructed if we represent the triplet by three component column vectors as follows

|1,1> = |1,0> = |1,1> = (1)

can then be represented by the matrix

1. Construct matrix representations for the raising and lowering operators, and acting on the eigenstates in the representation given in equation (1)
2. Use the relationships

To construct matrix representations of

1. Show that the matrix representations of obey the commutation relation