If the general angular momentum quantum number j is 1 there is a triplet of $|j,m\_{j}>$ states:

 $|1 ,1>, |1,0> and |1,-1>$

In this case a matrix representation for the operators $j\_{x} j\_{y} and j\_{z}, $ can be constructed if we represent the $|j, m\_{j}>$ triplet by three component column vectors as follows

|1,1> =$\left(\begin{matrix}1\\0\\0\end{matrix}\right)$ |1,0> =$\left(\begin{matrix}0\\1\\0\end{matrix}\right)$ |1,1> =$\left(\begin{matrix}0\\0\\1\end{matrix}\right)$ (1)

$j\_{z}$ can then be represented by the matrix

 $j\_{z}=\left(\begin{matrix}1&0&0\\0&0&0\\0&0&-1\end{matrix}\right)$

1. Construct matrix representations for the raising and lowering operators,$ j\_{+}$ and $j\_{-}$ acting on the eigenstates $|1 ,1>, |1,0> and |1,-1>$ in the representation given in equation (1)
2. Use the relationships

$j\_{x}=\frac{1}{2}\left(j\_{+}+j\_{-}\right)$ $j\_{y}=\frac{1}{2i}\left(j\_{+}-j\_{-}\right)$

 To construct matrix representations of $j\_{x}, j\_{y} and j\_{z}$

1. Show that the matrix representations of $j\_{x}, j\_{y} and j\_{z}$ obey the commutation relation

 $\left[j\_{x},j\_{y}\right]=iћj\_{z}$