

neglect.

~~Prove~~ Prove that (lie algebra). [100]

$$(a) [L^2, L_i] = 0 \quad (b) [L_i, L_j] = i\hbar \epsilon_{ijk} L_k$$

$$(c) L_z = -i\hbar \frac{\partial}{\partial \phi} = -i\hbar \left( x \frac{\partial}{\partial y} - y \frac{\partial}{\partial x} \right)$$

$$(d) S^2 = S_x^2 + S_y^2 + S_z^2 \\ = \frac{1}{2} (S_+ S_- + S_- S_+) + S_z^2$$

$$(e) [S_z, S_{\pm}] = \pm \hbar S_{\pm}$$

$$(f) [S^2, S_i] = 0$$