PROBLEM FORMALISM 3

The operators for the three components L_x, L_y, L_z of the angular momentum vector are:

$$\hat{L}_x = \hat{y}\hat{p}_z - \hat{z}\hat{p}_y, \qquad \hat{L}_y = \hat{z}\hat{p}_x - \hat{x}\hat{p}_z, \qquad \hat{L}_z = \hat{x}\hat{p}_y - \hat{y}\hat{p}_x.$$

Calculate the commutators $[\hat{L}_x, \hat{L}_y]$, $[\hat{L}_y, \hat{L}_z]$, $[\hat{L}_z, \hat{L}_x]$. Also calculate the commutator $[\hat{L}^2, \hat{L}_z]$ where L^2 is the square of the angular momentum vector.