Answer on Question #74740, Physics / Quantum Mechanics |

Determine the commutator Lz Ly.

Solution:

$$[L_z, L_y] = [xp_y - yp_x, zp_x - xp_z] = [xp_y, zp_x] - [xp_y, xp_z] - [yp_x, zp_x] + [yp_x, xp_z]$$
$$= zp_x[x, p_x] - 0 - 0 + yp_z[p_x, x]$$

Remembering that $[x, p_x] = -[p_x, x] = i\hbar$, we obtain

$$[L_z, L_y] = i\hbar(zp_x - yp_z) = -i\hbar L_x$$

Answer: $[L_z, L_y] = -i\hbar L_x$