Exercise Set 3

Sean Ericson
Phys 632

January 19, 2022

Exercise 1

If

$$\vec{J} = J_x\hat{x} + J_y\hat{y} + J_z\hat{z}$$

Then

$$\begin{aligned}\left(\vec{J}\times\vec{J}\right)_\gamma &= J_\alpha J_\beta \epsilon_{\alpha\beta\gamma} \\ &= J_\alpha J_\beta - J_\beta J_\alpha \\ &= [J_\alpha, J_\beta] \\ &= i\hbar J_\gamma\end{aligned}$$

Thus

$$\vec{J}\times\vec{J} = i\hbar\vec{J}$$