Homework Set #1

(1) Rotation group SO(3). In this exercise, you will be asked to derive eqs (8.27).

(a) Start with (8.22) and (8.23). Consider small angle $\theta$, derive the equation between (8.25) and (8.26).

(b) Show that $T_x, T_y, T_z$ are given by (8.26).

(c) Confirm $[T_x, T_y] = i T_z$.

(d) Prove the two expressions in part 4 of Exercise 8.51, p 245.

(e) Show that $\frac{d}{dt} = e^{-i\theta} \left( \frac{d}{dt} \right) e^{i\theta} = \left[ \text{expression given in eq. (8.23)} \right]$

(2) Exercise 8.55, p 247.

Prove the Thomas-Reich-Kuhn sum rule.