PHY 745 – Problem Set #4

This homework is due Wednesday, January 28, 2009. You may wish to use Maple to help you with the matrix multiplication. (Please note that Maple's definitions of operators may differ from ours. In particular, Maple's "Adjoint" is different from ours.)

Continue reading Chapter 3 in **Tinkham**.

1. On page 8 of **Tinkham**, you will find an example of 2-dimension representation of the triangular group described by Fig. 2-1 and the multiplication table in the previous page. Consider the following alternative 2-dimension representation:

$$E = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, A = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}, B = \begin{pmatrix} \frac{1}{2} & \frac{3}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{pmatrix}, C = \begin{pmatrix} \frac{1}{2} & -\frac{3}{2} \\ -\frac{1}{2} & -\frac{1}{2} \end{pmatrix},$$

$$D = \begin{pmatrix} -\frac{1}{2} & -\frac{3}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{pmatrix}, F = \begin{pmatrix} -\frac{1}{2} & \frac{3}{2} \\ -\frac{1}{2} & -\frac{1}{2} \end{pmatrix}$$

    (a) Show that this alternative representation satisfies the group multiplication table.

    (b) If the alternative representation is not unitary, use the procedure described in Section 3-2 of your text to transform it into a unitary transformation.