PHY 741 – Assignment #14

NAWH – October 13, 2003

1. Show that for a $j = \frac{1}{2}$ system, the transformation matrix for rotation about the three Euler angles α, β, and γ is given by

$$\mathcal{D}(\alpha, \beta, \gamma) = \begin{pmatrix} \cos\frac{\beta}{2} e^{-i(\alpha+\gamma)/2} & -\sin\frac{\beta}{2} e^{i(\alpha-\gamma)/2} \\ \sin\frac{\beta}{2} e^{-i(\alpha-\gamma)/2} & \cos\frac{\beta}{2} e^{i(\alpha+\gamma)/2} \end{pmatrix}. \tag{1}$$

2. Evaluate the transformation matrix for the case of rotation by $\theta = \frac{\pi}{2}\hat{\mathbf{x}}$. Check to make sure that you get the same answer using Euler angles and using the Pauli spin matricies.