

Homework Set G

Due Wednesday, September 17

1. Prove the parity operator Π , defined by $\Pi\psi(\mathbf{r}) = \psi(-\mathbf{r})$ is both Hermitian and unitary.
2. Consider the Hermitian matrix

$$H = E_0 \begin{pmatrix} 0 & 3i & 0 \\ -3i & 8 & 0 \\ 0 & 0 & 8 \end{pmatrix}$$

- (a) Find all three eigenvalues and eigenvectors of H
- (b) Construct the unitary matrix V which diagonalizes H . Check explicitly that $V^\dagger V = 1$ and $V^\dagger H V = H'$ is real and diagonal.