**Physics 451 - Fall 2012**

**Homework #12**
Due Thursday, Oct 11, by 7pm

Please place your assignment in the “Physics 451” slot across from N373 ESC. We have help sessions twice a week, in N337 ESC (undergraduate lab):

**T Th from 3 to 6 pm**

List of problems (from the textbook):

A8
A9
A11
A14
3.1
3.2

**Hints**

Problem A8: Formula to calculate the inverse of a matrix B

\[
B^{-1} = \frac{1}{\det B} \tilde{C}_B \quad \text{where} \quad C_B = \left[ (-1)^{i+j} \det(B_{i,j}) \right] \quad \text{where} \quad B_{i,j} \quad \text{is the sub-matrix obtained from B after erasing the i\textsuperscript{th} row and the j\textsuperscript{th} column. Here B, C_B and B^{-1} are 3x3 matrices while B_{i,j} are 2x2 matrices.}
\]

Problem A9

\[a^\dagger b = \langle a | b \rangle \quad \text{is a scalar} \]

\[ab^\dagger = |a\rangle \langle b| \quad \text{is a matrix} \]

Problem A14: a matrix A is orthogonal when \(\tilde{A} = A^{-1}\).

For real matrices, being “orthogonal” is the same as being “unitary”.

Problem 3.1: show that the sum of two square-integrable functions is still square-integrable, by using the Schwarz inequality.

Problem 3.2: the goal is to find for what range of \(\nu\), the function \(f\) is square-integrable.