PHYS 263; Homework #1. Due Mon. 2/6

1. Problem A.9, parts a,b,d only. (In appendix). Part d is a bit tricky; the answer is a matrix, not a scalar (this is called an "outer product").

2. Problem A.18, but stop after you get the eigenvectors and eigenvalues (don't construct S, etc.)

3. Problem A.25, parts a,b,c only.

4. Normalize the following wavefunctions (add a constant to force $\langle \psi | \psi \rangle = 1$). Always assume the normalization constant is real and positive. Also assume that all of the $|\psi_n\rangle$'s form an orthonormal basis (n=2,3,4) -- each of them are already independently normalized.

   a) $|\psi_A\rangle = 3|\psi_2\rangle - 2|\psi_3\rangle + 6|\psi_4\rangle$

   b) $|\psi_B\rangle = 3|\psi_2\rangle + 2i|\psi_3\rangle - 6|\psi_4\rangle$

   c) $|\psi_C\rangle = (3-2i)|\psi_2\rangle + (2+2i)|\psi_3\rangle + (4-5i)|\psi_4\rangle$

   d) Show how you could solve part c) in a one-line calculation. (Hint: $|a+ib|^2 = a^2+b^2$)

   e) Solve for the inner-product $\langle \psi_B | \psi_C \rangle$, as defined in your answers to parts b) and c) above. (Be sure to include both normalization constants that you found earlier.)