Physics 8.321, Fall 2002
Homework #6

Due **Monday, October 21** by 4:30 PM in the 8.321 homework box in 4-339B.

1. Sakurai: Problem 7, Chapter 2 (page 144)

2. Sakurai: Problem 9, Chapter 2 (page 145)

3. Sakurai: Problem 15, Chapter 2 (page 146)

4. Sakurai: Problem 16, Chapter 2 (page 146)

5. Consider the following Hamiltonian for a forced harmonic oscillator (using units $\hbar = m = 1$)

$$H(t) = \frac{1}{2}p^2 + \frac{1}{2}\omega^2 x^2 + f(t)x\,,$$

where $f(t)$ vanishes for $t \leq 0$. Assume that at $t = 0$ the oscillator is in its ground state. Show that the state at a later time is a normalized coherent state $N(t)\,|\phi(t)\rangle$. Express $N(t)$ and $\phi(t)$ in terms of integrals containing $f(t)$.