University of California, Berkeley
Physics 105 Fall 2006 Section 2 (*Strovink*)

ASSIGNMENT 5

Reading:
SCCM 3.5-3.7, 7.1-7.6
Taylor 8.1-8.8

1.
Obtain the Fourier series that represents the function

$$\begin{aligned} F(t) &= 0 \ \ (-\pi < \omega t < -\tfrac{\pi}{2}) \\ &= F_0 \sin 2\omega t \ \ (-\tfrac{\pi}{2} < \omega t < \tfrac{\pi}{2}) \\ &= 0 \ \ (\tfrac{\pi}{2} < \omega t < \pi) \ . \end{aligned}$$

2.
Consider a damped oscillator (as usual, characterized by γ, ω_0, and m) driven by a periodic force F. During one period,

$$-\pi < \omega t < \pi \ ,$$

F is taken to be equal to $F(t)$ in problem (**1.**); before and afterward, it simply repeats itself.

Find $x(t)$ for this oscillator. You may assume that any transient effects, due to the driving force having been turned on at $t = -\infty$, have damped out.

3.
Derive the Green function for a *critically damped* oscillator initially at rest at the origin. [*Hint*: Use the method of 105 Notes sections 3.5 and 3.6.]

4. Taylor Problem 8.10.

5. Taylor Problem 8.14.

6. Taylor Problem 8.17.

7. Taylor Problem 8.23.