EECS 216 – Winter 2008

Homework #5 – Assigned Feb. 12 – Due Tuesday Feb. 19

- **Grading:** Not all problems will be graded, but you should do all of them.

- **Submission:** Submit in *black box in room 4230 EECS* **before 5:00** on Tues. Feb. 19.

- **Read:** Text sections 3.3-3.5 (skip 3.2). **Topic:** Fourier Series expansions.

- **Next week:** Fourier transforms. Assigned before, and due after, winter break.

- **Suggestion:** Get started on HW #6 early and finish it before winter break.

1. *(15 points: 5@3)* Text #3.21. Even and odd functions make your life easier!

2. *(15 points: 3@5)* Text #3.29abc. Bode plots for RC circuit. EECS 215 problem.

3. *(20 points)* Text #3.9. Trigonometric Fourier series of half-wave rectified cosine.

   - Use the trig identity $2\cos(x)\cos(y) = \cos(x+y) + \cos(x-y)$, but watch limits.
   - You already know the answer – see last two problems of HW #4. Now derive it.

4. *(5 points)* Text #3.8. Complex exponential form of #3.9.

   - Multiply $\cos(t) = \frac{1}{2}e^{jt} + \frac{1}{2}e^{-jt}$ by e^{jnt}, but watch limits.
   - But if you have any sense you'll just use the result of #3.9, which is much easier.

5. *(25 points)* Text #3.15ab. Fourier series of periodic extension of t^2.

   - Use indefinite integral $\int t^2 \cos(at)dt = \frac{1}{a^2}2t\cos(at) + \frac{1}{a^3}(a^2t^2 - 2)\sin(at) + C$
   - The answer is given in the problem. You still must derive it.

6. *(20 points)* Text #3.18. Fourier series of impulse trains.

   We will use this result to derive the sampling theorem.