

Problem Set 9

Fall 2006

Issued: November 14, 2006**Due: Monday, November 20, 2006****Reading in Lathi**

Note changes from original syllabus, regarding dates of RATs and sections to read.

11/20/06 — No RAT on this day, but it will help to read Section 7.1

11/27/06 — Sections 7.1-7.3

Note: you may find the trigonometric formulas and table of integrals in Section B7.6-B7.7 of your textbook useful for this homework.

Problem 6.1-7 in Lathi

Do parts e, f, and g only.

Problem 6.3-2 in Lathi

Additional part:

Write a short Matlab function to compute the exponential Fourier series components for this signal. You will use this function, along with the `ctfs_synthesis` function provided on the course website to synthesize the signal for the following cases:

- $A = \frac{\pi}{2}$. Compute and plot the signal using $N = 20$ and $N = 100$. Compare your results. What is happening near each of the discontinuities?
- $A = \frac{\pi}{64}$. Compute and plot the signal using $N = 20$ and $N = 100$. Compare your results. What is happening near each of the discontinuities?

Can you explain these results? You might find Section M6.1 of your textbook helpful.

Problem 6.4-2 in Lathi

ECE-220 Problem 16 For this problem, consider the signals shown in Figure P6.1-1 on page 669 of the Lathi textbook. (These are the figures for Problem 6.1-1 in the book.)

- Determine the exponential Fourier series for the signal shown in Figure P6.1-1b.
- Determine the exponential Fourier series for the signal shown in Figure P6.1-1d.

Extra Credit Worth a 25% bonus on this homework!

Use Matlab to check your answers for Problems 6.1-7 and ECE 220 Problem 16.

- For Problem 6.1-7, provide plots of the signals and verify that the periods you calculate are correct.
- For ECE 220 Problem 16, synthesize the signals using the `ctfs_synthesis` function provided on the course website. Write your own function to implement the coefficients for each of the signals. Plot the signals using your function and `ctfs_synthesis` for several different values of N . Verify that the coefficients you computed are correct.

You should hand in your plots, a brief description of what they mean, and the Matlab code.