Name _____ ID3 _ _ _

ECS 332: Principles of Communications **2019/1**

HW 6 — Due: October 23, 4 PM

Lecturer: Prapun Suksompong, Ph.D.

Instructions

(a) This assignment has 2 pages.

(b) (1 pt) Hard-copies are distributed in class. Original pdf file can be downloaded from the course website. Work and write your answers **directly on the provided hardcopy/file** (not on other blank sheet(s) of paper).

(c) (1 pt) Write your first name and the last three digits of your student ID in the spaces provided on the upper-right corner of this page. Furthermore, for online submission, your file name should start with your 10-digit student ID, followed by a space, the course code, a space, and the assignment number: "5565242231 332 HW6.pdf"

(d) (8 pt) Try to solve all problems.

(e) Write down all the steps that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

Problem 1. Consider the impulse train $G(f)$ shown on the right in Figure 6.1. Plot $g(t)$.

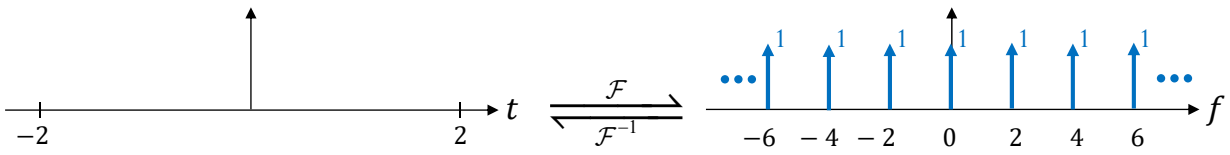

Figure 6.1: A train of impulses in the frequency domain

Problem 2. Consider a signal $r(t) = \sum_{k=-\infty}^{\infty} 2e^{j4\pi kt}$. Plot $r(t)$ and $R(f)$.
Hint: Don't try to actually plot each complex-expo. func. and add them. It is quite hopeless to determine their combination.

Problem 3. Consider a "square" wave (a train of rectangular pulses) shown in Figure 6.2. Its values periodically alternates between two values A and 0 with period T_0. At $t = 0$, its value is A.

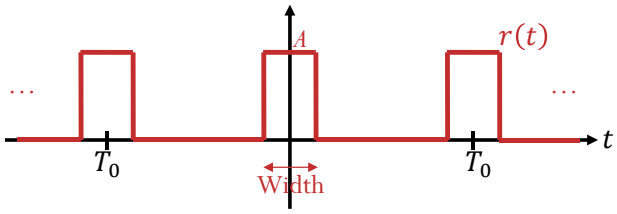

Figure 6.2: A train of rectangular pulses

Some values of its Fourier series coefficients are provided in the table below:

k	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
c_k	$-\frac{\sqrt{2}}{7\pi}$	$-\frac{1}{3\pi}$	$-\frac{\sqrt{2}}{5\pi}$	0	$\frac{\sqrt{2}}{3\pi}$	$\frac{1}{\pi}$	$\frac{\sqrt{2}}{\pi}$	$\frac{1}{2}$	$\frac{\sqrt{2}}{\pi}$	$\frac{1}{\pi}$	$\frac{\sqrt{2}}{3\pi}$	0	$-\frac{\sqrt{2}}{5\pi}$	$-\frac{1}{3\pi}$	$-\frac{\sqrt{2}}{7\pi}$

(a) Find its duty cycle.

(b) Find the value of A. (Hint: Use c_0.)