EE3210 Signals and Systems

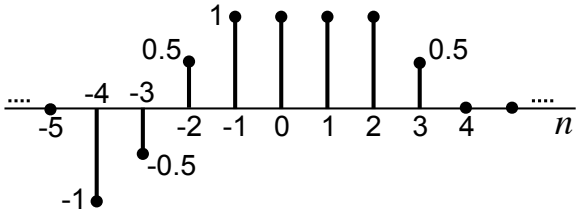
Assignment 1

Instructions:

1. There are three problems in this assignment. Answer all questions.
2. The total marks for this assignment is 8 marks.
3. In answering the questions, you need to note that:
   - It is important for you to show us your intermediate steps and tell us what arguments you have made to obtain the results.
   - Both the intermediate steps and the arguments carry marks.
   - If you can show us the perfect intermediate steps and the in-between arguments but get the final results wrong for some reason, we will still award you marks for having understood the subject matter.
4. The submission deadline is 23:59:59 Thursday 13 February 2014.
5. Late submission penalty: 20% per day will be subtracted for late submission. Submissions that are overdue for more than four days will receive **ZERO** mark.
6. Submit your assignment on e-Portal/Blackboard.
   - The file must be in Acrobat `pdf` format.
   - The file must be named as `Assignment1-student ID.pdf`. For example, if your student ID is 12345678, the file name must be `Assignment1-12345678.pdf`.
7. For information on how to submit assignments on e-Portal/Blackboard, see

   `http://www6.cityu.edu.hk/elearn/animation/student/submit_assignment.htm`

Problem 1: (2 marks) A discrete-time signal $x[n]$ is shown in the figure below.



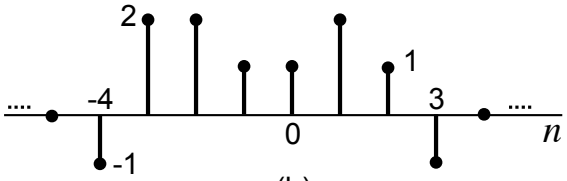
Sketch and label carefully each of the following two signals:

(a) $x[n]u[3-n]$

(b) $x[n-2]\delta[n-2]$

Problem 2: (2 marks) Determine and sketch the even and odd parts of the two signals depicted in the figure below. Label your sketches carefully.

(a)



(b)

Problem 3: (4 marks) In this problem, we explore several of the properties of even and odd discrete-time signals.

(a) Show that if $x[n]$ is an odd signal, then

$$\sum_{n=-\infty}^{+\infty} x[n] = 0$$

(b) Show that if $x_1[n]$ is an odd signal and $x_2[n]$ is an even signal, then $x_1[n]x_2[n]$ is an odd signal.

(c) Let $x[n]$ be an arbitrary signal with even and odd parts denoted by $x_e[n]$ and $x_o[n]$, respectively. Show that

$$\sum_{n=-\infty}^{+\infty} x^2[n] = \sum_{n=-\infty}^{+\infty} x_e^2[n] + \sum_{n=-\infty}^{+\infty} x_o^2[n].$$

– – – – End of assignment – – – –