

EE3210 Signals and Systems

Assignment 2

Instructions:

1. There are four 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 17:00 Friday 28 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 with the format **Assignment2-student ID.pdf**.
 - For example, if your student ID is 12345678, the file name must be: **Assignment2-12345678.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: (1.5 marks) Consider the signal

$$x(t) = \cos(2t) + \sin(2\pi t)$$

Determine whether or not $x(t)$ is periodic. If $x(t)$ is periodic, determine its fundamental period.

Problem 2: (3.5 marks) Consider the discrete-time system whose input $x[n]$ and output $y[n]$ are related by

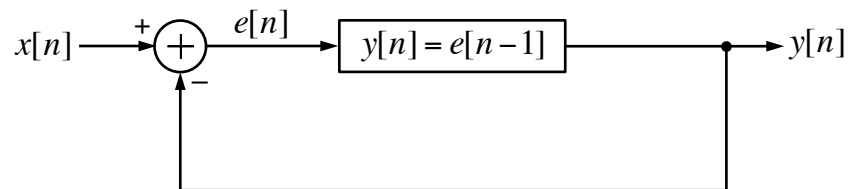
$$y[n] = x[2n].$$

Determine which of the following properties hold for this system:

- (a) Memoryless
- (b) Invertible
- (c) Causal
- (d) Stable
- (e) Time invariant
- (f) Linear

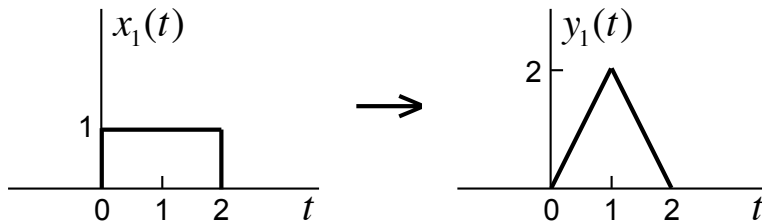
Justify your answers.

Problem 3: (1.5 marks) Consider the feedback system shown in the figure below.

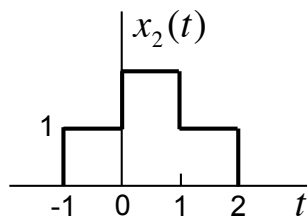


Assume that $y[n] = 0$ for $n < 0$. Sketch the output signal $y[n]$ when $x[n] = u[n]$, where $u[n]$ is the discrete-time unit step signal.

Problem 4: (1.5 marks) Consider a linear and time-invariant system whose response to the signal $x_1(t)$ as shown in the figure below is the signal $y_1(t)$ as shown in the figure below.



Determine and sketch the response of the system to the input $x_2(t)$ as shown in the figure below.



— — — End of assignment — — —