EEE2035F: Signals and Systems I

Class Test 1

14 March 2016

Name:

Student number:

Information

- The test is closed-book.
- This test has *four* questions, totaling 20 marks.
- There is an information sheet attached at the end of this paper.
- Answer *all* the questions.
- You have 45 minutes.

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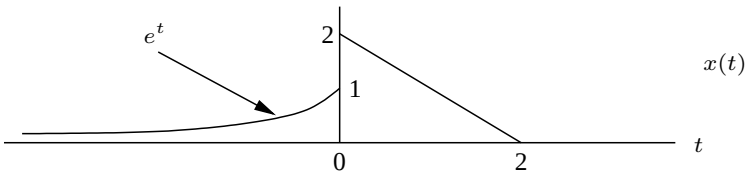
1. (5 marks) Consider the signal $x(t)$ below:



Sketch the following:

(a) $y_1(t) = x(t-2)$

(b) $y_2(t) = x(-t-2)$

(c) $y_3(t) = x(t/2-1)$

(d) $y_4(t) = \frac{d}{dt}x(t)$.

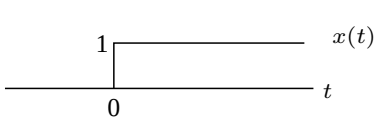
2. (5 marks) A system with input $x(t)$ and output $y(t)$ is governed by the input-output relationship

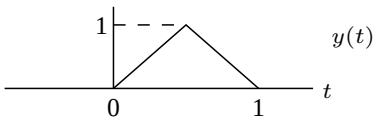
$$y(t) = \int_0^\infty e^{-\tau} x(t-\tau) d\tau.$$

(a) Show that the system is time invariant.

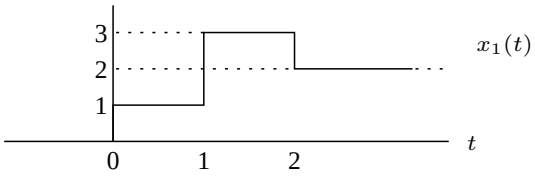
(b) Assuming that the system in linear and time invariant, find its impulse response $h(t)$.

3. (5 marks) Suppose we have a linear time-invariant system for which the input $x(t)$ below produces the output $y(t)$:





Find the output $y_1(t)$ when the input is the signal $x_1(t)$:



4. (5 marks) Find and plot $y(t) = h(t) * x(t)$ when $h(t) = e^{-t}u(t)$ and $x(t) = u(t-1)$.