EEE2035F: Signals and Systems I

Class Test 1

12 March 2010

Name:

Student number:

Information

- The test is closed-book.
- This test has *four* questions, totalling 20 marks.
- Answer *all* the questions.
- You have 45 minutes.

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1. (5 marks) Sketch the following signals, where $u(t)$ is the unit step function:
   (a) $x_1(t) = u(t) - u(t-1)$
   (b) $x_2(t) = u(2t)$
   (c) $x_3(t) = u(2(t-1))$
   (d) $x_4(t) = u(t-\lambda)$
   (e) $x_5(\lambda) = u(t-\lambda)$.

2. (5 marks) A system is defined by the relationship $y(t) = x(-t)$, where $x(t)$ is the input and $y(t)$ the output.
   (a) Is the system causal? Why?
   (b) Is the system linear? Why?
   (c) Is the system time invariant? Why?

3. (5 marks) Suppose $x(t)$ is the signal $x(t) = e^{-2t}u(t)$. Find the following signals, giving a precise mathematical expression for the answer in each case:
   (a) $y_1(t) = \frac{d}{dt}x(t)$
   (b) $y_2(t) = \int_{-\infty}^{t} x(\lambda)d\lambda$.

4. (5 marks) Find and plot $y(t) = u(t) * u(t)$.