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.





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):

$$\begin{array}{c|c} 1 & & & \\ \hline & & \\ \hline & & \\ 0 & & t \end{array} \qquad \begin{array}{c|c} 1 & & \\ \hline & & \\ 0 & & 1 \end{array} \begin{array}{c} y(t) \\ t \end{array}$$

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).