

EEE2035F: Signals and Systems I

Class Test 1

11 March 2011

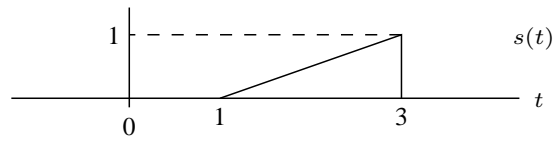
Name:

Student number:

Information

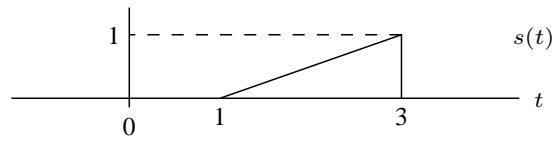
- The test is closed-book.
 - This test has *four* questions, totalling 25 marks.
 - Answer *all* the questions.
 - You have 45 minutes.
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1. (10 marks) Plot the signals given below. Where appropriate, assume that $s(t)$ is the signal



- (a) $x_1(t) = \cos(\pi t)$.
- (b) $x_2(t) = \cos(\pi t)u(t + 1)$.
- (c) $x_3(t) = \frac{d}{dt}s(t)$ (the generalised derivative).
- (d) $x_4(t) = \int_{-\infty}^t s(\lambda)d\lambda$.
- (e) $x_5(t) = s(3 - t)$.

2. (5 marks) Let $s(t)$ be the signal



and suppose that $y(t) = \delta(t) - \delta(t - 2)$.

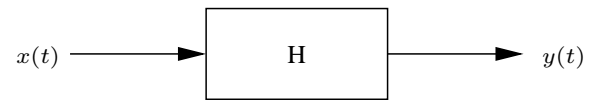
- (a) Plot $y(t)$.
- (b) Calculate $\int_{-\infty}^{\infty} s(t)y(t)dt$.
- (c) Find $z(t) = \int_{-\infty}^{\infty} s(\lambda)y(t - \lambda)d\lambda$.

3. (5 marks) Let $x(t) = u(t - 2)$ and $h(t) = u(t - 1)$, where $u(t)$ is the unit step

$$u(t) = \begin{cases} 1 & (t \geq 0) \\ 0 & (t < 0). \end{cases}$$

- (a) Plot $x(t)$ and $h(t)$.
- (b) Find and plot $y(t) = x(t) * h(t)$.

4. (5 marks) Suppose we have a system



that obeys the input-output relationship $y(t) = x(t) + 1$.

- (a) Find and plot the output $y_1(t)$ when the input is $x_1(t) = u(t)$.
- (b) Find and plot the output $y_2(t)$ when the input is $x_2(t) = 2u(t)$.
- (c) Is the system homogeneous?
- (d) Is the system linear?