EEE2035F: Signals and Systems I
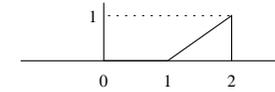
Class Test 1

20 March 2009

Name:

Student number:

Information

- The test is closed-book.

- This test has *four* questions, totalling 20 marks.
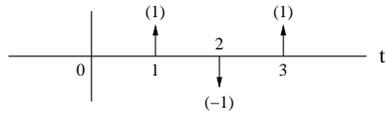
- Answer *all* the questions.

- You have 45 minutes.

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1. (6 marks) Suppose $x(t)$ is the signal below:

Sketch the following:

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

(b) $y_b(t) = \frac{d}{dt}x(t)$ (generalised derivative)

(c) $y_c(t) = \int_{-\infty}^{t} x(\tau)d\tau$

(d) $y_d(t) = [\delta(t+1) - \delta(t)] * x(t)$

(e) $y_e(t) = [u(t+1) - u(t)] * x(t)$ (Hint: use the result from part (d)).

2. (4 marks) Suppose a LTI system has the impulse response $h(t)$ shown below:

Find the output of the system for each of the following input signals:

(a) $x_a(t) = \delta(t)$

(b) $x_b(t) = \delta(t-1)$

(c) $x_c(t) = u(t)$.

3. (5 marks) The input $x(t)$ and output $y(t)$ of a given system satisfies the following relationship for all t:

$$y(t+4) = \int_t^{t+1} x(\lambda)d\lambda.$$

(a) Is the system causal? Explain.

(b) What is the output of the system when the input $x(t)$ is the unit step?

4. (5 marks) Use the graphical method to convolve the two signals below: