

EEE2035F: Signals and Systems I

Class Test 1

20 March 2009

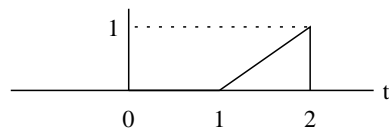
Name:

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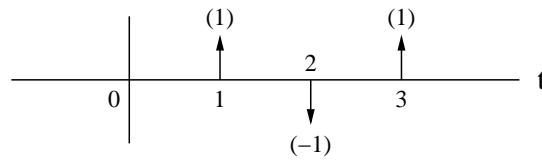
1. (6 marks) Suppose $x(t)$ is the signal below:



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:

