EEE4001F: Digital Signal Processing

Class Test 1

22 March 2007

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) Determine the impulse response of the LTI system described by the difference equation

$$y[n] - 0.2y[n-1] = x[n] + 0.5x[n-1]$$

under the assumption that it is causal. Is the system stable?

2. (5 marks) Which of the impulse responses

$$h_1[n] = 3\delta[n-2] + \delta[n-4]$$
$$h_2[n] = u[n-3] - u[n+5]$$

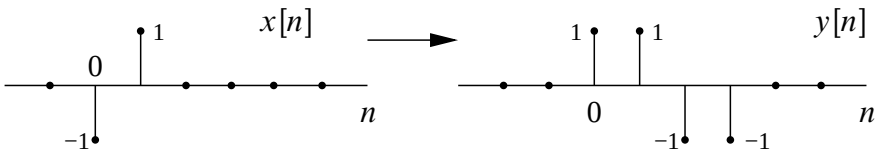
describe causal, stable, LTI processors? Give reasons for your answers. Sketch the step response of each system.

3. (5 marks) Convolve the signals

$$x_1[n] = \delta[n] - \delta[n-2] + \delta[n-3] \quad \text{and} \quad x_2[n] = 2\delta[n-1] + \delta[n-2] - \delta[n-3]$$

using the z-transform.

4. (5 marks) Suppose $y[n]$ is the output of an LTI system when $x[n]$ is the input:



Find the response of the system to the input