Lund University
Department of Electrical and Information Technology

Systems and Signals, EITF75
Task 1 (out of 2)

Deadline: Complete the task, and hand it in in the course mailbox at the third floor no later than September 30, 23.59.

Observe: To simplify the grading procedure:
- Solve one problem per paper sheet
- Write your name on every paper

Statements must be well motivated by reasoning and/or equations
Points from the tasks will be added to the examination score
Maximum total score (exam + 2 tasks) = 5.0+0.5+0.5=6.0p
Grading: 3 (>2.9p), 4 (>3.9p), 4 (>4.9p)

1. **Indicate which of the following statements are correct and which are false. (5 correct answers out of 6 gives 0.1p).**

   a. The one-sided z-transform is only used when the signal is causal, since the normal z-transform then reduces to the one-sided.

   b. The signal h(n) cannot be uniquely obtained from H(z) unless its ROC is specified.

   c. A causal FIR filter has poles at z=0.

   d. Even if the signal h(n) is not BIBO stable, its Fourier transform may still exist.

   e. Any linear system can be represented by an impulse response

   f. If the Fourier spectrum is discrete, it follows that the corresponding signal is time-continuous.

2. **A system is given by**

$$y(n) = \frac{1}{2}y(n-1) + nx(n)$$

   a. Is the system LTI ? (0.1)

   b. Provide the output for the input $x(n) = \delta(n)$. (0.1)

   c. For $x(n) = \left(\frac{1}{5}\right)^n u(n)$, find the z-transform $Y(z)$ of the signal $y(n)$. (0.1)

   d. Let the output signal $y(n)$ be the input to a FIR filter with impulse response {1,-1/5}. Find the output signal of the FIR filter. (0.1)