

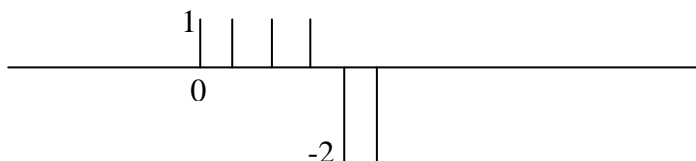
EE422G Homework #10 (10 points)

Due March 30, 2006

1. (2 points) Determine the z-transform and ROC for the following time signals:
 - a. $x(nT) = \delta(nT-kT)$, $k>0$
 - b. $x(nT) = (1/4)^n(u(nT)-u(nT-5T))$
 - c. $x(nT) = (1/2)^n u(nT) * 2^n u(nT-kT)$ (* = convolution)
 - d. $x(nT) = n \sin(\pi n/2) u(nT)$

2. (2 points) Determine the signal $h(nT)$ corresponding to the following Z-transform:
 - a. $H(z) = 1+2z^{-6}+4z^{-8}$
 - b. $H(z) = \frac{1 + 7/6 z^{-1}}{(1 - 1/2 z^{-1})(1 + 1/3 z^{-1})}$
 - c. $H(z)$ is casual with a pole at $z=1/2$ and $h(1 \cdot T) = 1$.
 - d. $H(z) = X(z)^2$ where $x(nT) = n^2 3^n u(nT)$

3. (1 point) The impulse response of a linear time-invariant system is shown below. Carefully sketch the output response of this system to the input $x(nT) = u(nT-4T)$.



4. (1 points) Give the Direct Form I, II, Cascade and Parallel Implementations of

$$H(z) = \frac{1 - 0.5z^{-1}}{(1 - 0.3z^{-1})(1 + 0.5z^{-1})}$$

5. (2 points) Discrete-time linear systems
 - e. A system has impulse response $h(nT) = (1/2)^n u(nT)$. Determine the input to the system if the output is given by $y(nT) = 2\delta(nT-4T)$.
 - f. A causal system has input $x(nT) = \delta(nT) + 1/4\delta(nT-T) - 1/8\delta(nT-2T)$ and output $y(nT) = \delta(nT) - 3/4\delta(nT-T)$. What is its transfer function?

6. (2 points) Determine the transfer function of the following block diagram.

