

Show your work on all problems. Unjustified correct answers will not be given full credit.

1. The impulse response of a linear discrete system is given by:

$$h(n) = \{1 \ 2 \ 2 \ 1 \ 0 \ 0 \ 0 \ \dots\}$$

Use a convolution table to find the output if the input is given by:

$$x(n) = \{2 \ 1 \ 1 \ 2 \ 0 \ 0 \ 0 \ \dots\}$$

	n →						

2. The impulse response of a linear discrete system is given by:

$$h(n) = \{1 \ 2 \ 2 \ 1 \ 0 \ 0 \ 0 \ \dots\}$$

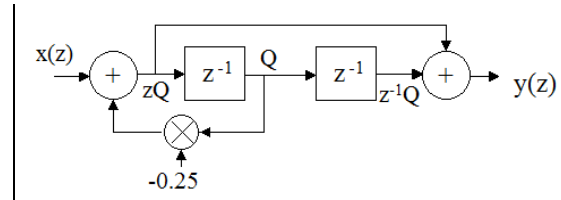
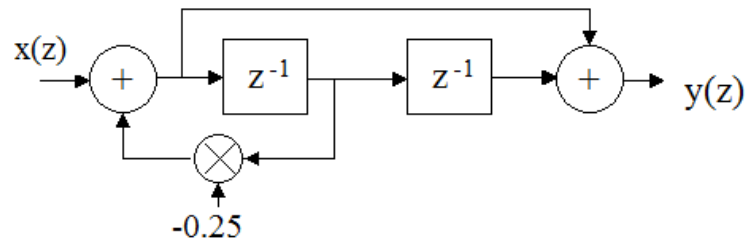
Find the transfer function in z .

3. Describe, in English, the process of convolution with respect to a signal being processed through a system.

4. A transfer function is given by $H(z) = \frac{k(z+1)}{z^2 - 1.4z + 0.5}$

Find the value of k so that the gain at 0 Hz = 1.0.

5. Find the transfer function in z for the system shown below.



6. Find the lowest frequency which can alias as 1 KHz if the sample frequency is 7 KHz?

7. At what sampling frequency must the signal $f(t)$ below be sampled in order that no information is lost in the sampling. _____ Hz

$$f(t) = 3 + 2\sin(20\pi t) + \cos(250\pi t) + 15\sin(500\pi t + 30^\circ)$$

8. A discrete linear system has an impulse response given by $h(n) = \{1, .5, 0, 0, 0, \dots\}$. If two such systems are connected in *series* what is the impulse response of the combined set?

9. The figure below shows the frequency response of a low pass filter whose sample frequency is 11,025 KHz. If a unit step is applied to this system what will be the output of the system *after* the transient has died away? Explain your answer.

