Name:

Problem	Points	Score
1(a)	10	
1(b)	10	
1(c)	10	
2(a)	10	
2(b)	10	
2(c)	10	
2(d)	10	
3(a)	10	
3(b)	10	
3(c)	10	
Total	100	

Notes:

1. The exam is open books/open notes.

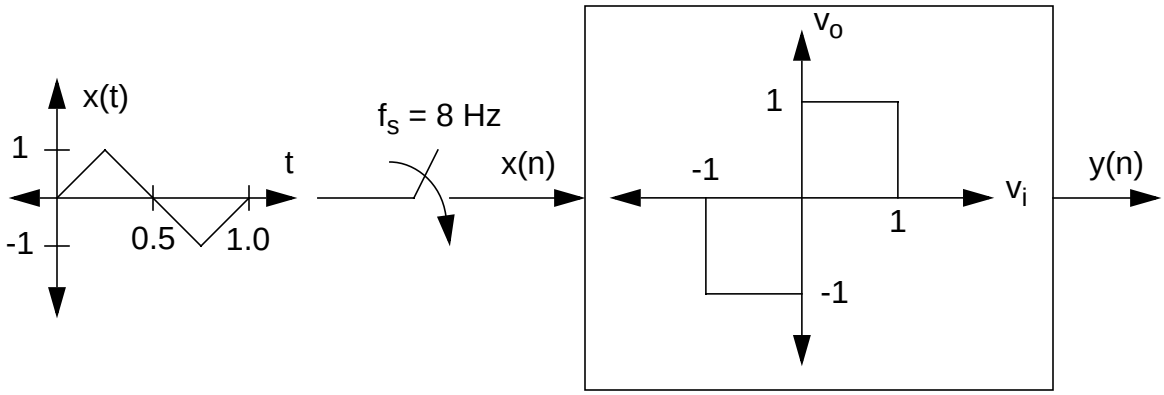
2. Please show ALL work. Incorrect answers with no supporting explanations or work will be given no partial credit.

3. If I can't read or follow your solution, it is wrong, and no partial credit will be given — BE NEAT!

4. Please indicate clearly your answer to the problem.

5. Several problems on this exam are fairly open-ended. Since the evaluation of your answers is obviously a subjective process, we will use a marketplace strategy in determining the grade. Papers will be rank-ordered in terms of the quality of the solutions, and grades distributed accordingly.

1. For the following system:

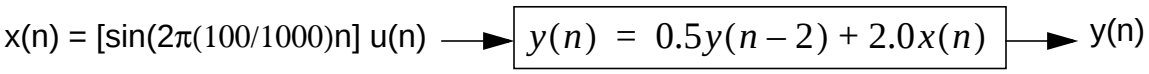


(a) Compute the energy of the input signal, x(n) (assume sampling starts at t=0).

(b) Compute the signal to noise ratio of the output signal.

(c) Characterize the frequency response of the quantization noise with respect to the input signal, the output signal, and the quantizer.

2. For the signal and system shown:



(a) What is the value of y(n) at t= 1,000,000 secs.

(b) What is the value of y(n) at t = 0.01 secs?

(c) Is this system stable? Prove this by analyzing the system transfer function.

(d) Plot the frequency response of the system.

3. A cross-correlation operation is defined as:

$$\Phi(k) = \sum_{n=0}^{N-1} x(n)h(n+k)$$

(a) Implement this function in MATLAB using only functions involving linear algebra (matrix and vector manipulations — no higher-level functions such as autocorrelation) and/or lower-level code.

(b) Implement the core operation inside the summation in TMS 320C3X code.

(c) Discuss some of the issues involving implementation of this function on the C3X DSK.