

ECE 308 - SAMPLE MIDTERM

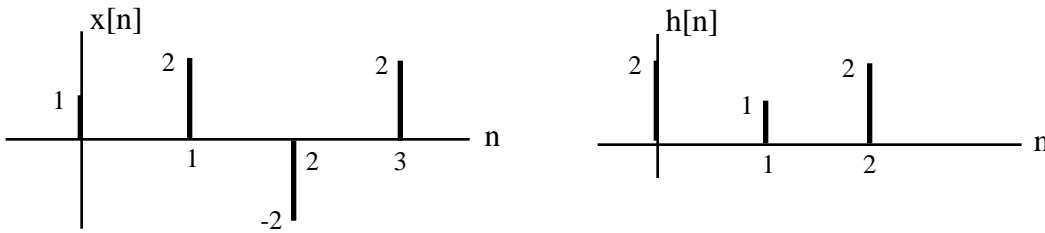
You must show your work to get credit.

1. (5 points) What's an advantage of discrete systems
2. (5 points) How fast - in samples per second - would you sample $x(t)$ to prevent aliasing

$$x(t) = 5 \cos(1000t + 1.2) + 2 \cos(3000t - 2.3)$$
3. (5 points) Explain why the frequency responses of linear time-invariant systems are periodic
4. (5 points) Sketch the frequency response of an ideal bandpass discrete system with $\omega_s = 2000$
5. (10 Points) Find the difference equation whose zero state responses are twice those of the zero state responses of

$$y[n] = 0.5 y[n - 1] + x[n] + 2 x[n - 1]$$

6. (15 points) Find the zero state response of the linear time-invariant discrete system with input $x[n]$ and impulse response $h[n]$ as follows



7. (10 points) Find the transfer function $H(e^{j\omega T_s})$ of the discrete system with difference equation

$$y[n] = 0.7y[n-1] - 0.5y[n-2] + x[n]$$

8. (15 points) Find the sinusoidal steady state response $y[n]$ of the difference equation

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

to $x(t) = 5 \cos(1000t + 1.2)$ sampled at $\omega_s = 3000$

9. (15 Points) Find the DFS coefficients X_k of the following periodic sequence

