Department of Electrical and Computer Engineering
The University of Alabama in Huntsville

CPE 381: Fundamentals of Signals and Systems for Computer Engineers

Quiz #5 solution

1. (20 points) Support of X(Ω) is **INVERSELY** proportional to the support of x(t).

2. (20 points) What is the transfer function of the following circuit? What is the type of filter it implements?

   $H(s) = Ls / (R+1/(Cs) +Ls) = LCs^2 / (LCs^2 + RCs + 1)$ → HIGH PASS filter

3. (20 points) At Ω =0

   $H(s) = LCs^2 / (LCs^2 + RCs + 1) = 0/1 = 0$

4. (20 points) Microcontroller with integrated 10-bit AD converter uses 1.5V internal voltage reference as Vr+ and Ground as Vr-.

   What is the maximum error of the AD conversion?

$$\Delta = \frac{V_{R+} - V_{R-}}{2^{10} - 1} = \frac{1.5V - 0V}{1023} = 1.466mV \approx 1.5mV$$

5. (20 points) What is the minimum sampling frequency if the maximum frequency of the input signal is 60Hz?

Nyquist: Fs ≥ 2*60 Hz → Fs ≥ 120 Hz