DSP Quiz 5

11/16/2020

Name:  
  
Question 1

The following spectrograms were computed using either rectangular or Hamming windows, on the same signal. Answer the following questions, justify your answer completely.

1. Which spectrograms were computed with a rectangular window?
2. Which spectrograms have approximately the same frequency resolution?
3. What is the approximate time window of spectrogram a? Mark the plot if it helps indicate your answer
4. Write as detailed an equation as you can for the ‘eye’s, assuming that only pure sinusoidal tones were used to create them.



Question 2

Consider the following plot of the magnitude, in dB, of the DFT of a continuous time signal sampled at T= 10-3. A 32 point DFT was taken using a rectangular window.

Chart, histogram

Description automatically generated

Listed below are 10 signals, one or more of which could have been the continuous time signal that produced the above plot. Indicate which signals could have been the input signal xc(t). Justify your answer completely

x1(t) = 1000 cos(230\*π\*t) x6(t) = 1000 exp(j\*250\*π\*t)

x2(t) = 1000 cos(115\*π\*t) x7(t) = 10 cos(250\*π\*t)

x3(t) = 10 exp(j\*460\*π\*t) x8(t) = 1000(cos(218.75\*π\*t)

x4(t) = 1000 exp(j\*230\*π\*t) x9(t) = 10 exp(j\*200\*π\*t)

x5(t) = 10 exp(j\*230\*π\*t) x10(t) = 1000 exp(j(187.5\*π\*t)