Assignment 2

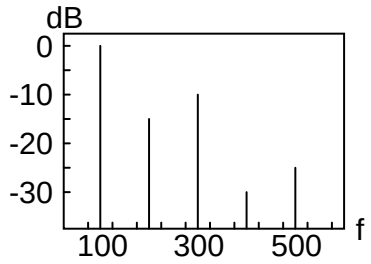
Due Monday, March 20. Show your work. Submit your assignment using the appropriate dropbox on the course web site. Assignments submitted after the solutions are made available will be given a mark of zero.

Question 1

A digital radio system operates at a symbol rate of 1 MHz over channels of 5 MHz. You have been asked to buy an RF amplifier for this system and find one whose group delay variation over any 5 MHz frequency range is specified as $< 1\ \mu s$. Is this amplifier suitable for this application? Why or why not?

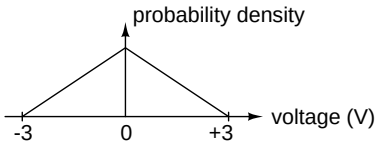
Question 2

The following diagram show the spectrum analyzer display for a waveform with a 100 Hz fundamental frequency. What is the THD?



Question 3

A noise source has a triangular probability density:



(a) What are the units on the vertical axis?

(b) What is the area under the curve?

(c) What is the probability that the noise has a level greater than 1 V?

Question 4

Draw the waveform that would be used to transmit the bit sequence 1011 0111 using differential Manchester coding. Assume the previous symbol was a high level followed by a low level.

Question 5

What is the maximum slew rate for a 1 kHz sine wave with an amplitude of 1 V? *Hint: the slope (derivative) of the signal* $A\sin(2\pi ft)$ *is given by* $A2\pi f\cos(2\pi ft)$ *and is maximum at* $t = 0$..