# Assignment 1

*Due Thurstady, March 9. 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

You want to sample and quantize a signal with a bandwidth of 300 Hz and want to ensure the quantization SNR is more than 60 dB. How fast do you need to sample? What is the minimum resolution of each sample (in number of bits)?

## Question 2

What is/are the minimum/maximum number of bytes required to encode any character using the UTF-16 encoding? How many bytes are required to encode the most common characters?

## Question 3

A TV station transmits a 50 kW signal at 200 MHz. The transmit antenna has a gain of 16 dB. At what distance from the transmitter will a receiver with an omnidirectional antenna (gain=0 dB) receive a power of 1 $\mu$W?

## Question 4

What is the characteristic impedance of a pair of 12-gauge wires running next to each other? Assume each wire's insulation is 1 mm thick.