SE3910 Quiz 4 Name:

This is a closed-book, closed-computer, etc. quiz. Review all questions before you get started. ***Show all work. Box your final answer.*** SI multipliers in order from smallest to largest: p, n, μ, m, (1), K, M, G, T. ***Give*** your answer to 2 or 3 significant figures.

1. (5 points) Unit analysis. Consider a signal with a frequency of 1GHz (SI) and a wave propagation speed of 200,000,000 m/s. ***Determine*** the distance the wave propagates during one period of the signal. (This is the wavelength.) ***Use*** an appropriate SI multiplier.

1. (5 points)Audio Signals. ***Determine*** the bitrate (in bits/second) necessary to send an uncompressed signal with a maximum audio frequency of 40 KHz. Assume that each sample can have one of 256 values. ***Use*** an appropriate SI multiplier.
2. (5 points) Channel Capacity. ***Determine***, in bits/second, the maximum theoretical bit-rate that can be sent through an analog channel with a bandwidth of 1 MHz and a signal-to-noise ratio of 30 dB. ***Use*** an appropriate SI multiplier, and use the approximations 2­10=1024. $B=Hlog\_{2}(1+S/N)$

1. (5 points) ***Describe*** how Qt implements emitting a signal. Assume both the emitting code and the object with the slot are on the same thread.