Quiz Number 1
Closed Book; Closed Notes; Time Given=10 minutes (Sep. 09, 2005)

“I certify that I have neither received nor given unpermitted aid on this examination and that I have reported all such incidents observed by me in which unpermitted aid is given.”

Name ___________________________ Student ID ____________________ Signature ______________________

Question 1: [5 points]
(a) [2 points] The AM band standardized for commercial radio transmission spans from 535 kHz to 1605 kHz. Each channel is assigned a 10 kHz bandwidth. What is the maximum number of AM channels that can be accommodated in the standard AM band?

(b) [3 points] For transmission in the 535 kHz to 1605 kHz band, we may allocate channels with some separation in between. This separation, called the guard band, is provided to avoid any interference between adjacent channels. If each channel uses 10 kHz, the guard band is 5 kHz, and the first channel is centered at 545 kHz, how many channels can be accommodated in the available band?

Question 2: [5 points] A city is selling FM channels for transmission in the standard FM band which ranges from 88 MHz to 108 MHz, for Rs. 1M per channel. If the first channel is centered at 88.1 MHz and each FM channel is 200 kHz wide, what is the maximum amount the city may expect to raise?

Question 3: [5 points] For a channel with bandwidth $B$ Hz, the maximum rate at which data can be transmitted is $B \log_2(1 + SNR)$, as given by Shannon. Approximately, how fast can we transmit data on a phone line with 30 dB $SNR$? (Hint: dB is 10 log of power ratio)