City University of Hong Kong
Department of Electronic Engineering

EE3009 Data Communications and Networking

Tutorial 8

1. A scanner has a resolution of 600 × 600 pixels/square inch. How many bits are produced by an 8-inch × 10-inch image if scanning uses 8 bits/pixel?

2. A high-quality speech signal has a bandwidth 8 kHz, and $V/\sigma = 4$.
   a) Suppose that the speech signal is to be quantized and then transmitted over a 32 kbps modem. What is the SNR of the received speech signal?
   b) What modem speed is needed if we require an SNR of 40dB?

3. A 10 KHz baseband channel is used by a digital transmission system. Ideal pulses are sent at the Nyquist rate, and the pulses can take 16 levels. What is the bit rate of the system?

4. What is the maximum reliable bit rate possible over a telephone channel with the following parameters:
   a) W = 2.4 KHz, SNR = 20 dB
   b) W = 3.0 KHz, SNR = 20 dB