1. A scanner has a resolution of $600 \times 600$ pixels/square inch. How many bits are produced by an 8-inch$\times$10-inch image if scanning uses 8 bits/pixel? 24 bits/pixel?

2. Compare the attenuation in a 100 km link for optical fibers operating at 850 nm, 1300 nm, and 1550 nm.

3. Suppose that a low-pass communications system has a 1 MHz bandwidth. What is the maximum attainable bit rate using 8-level pulses? What is the Shannon capacity of this channel if the SNR is 20 dB? 40 dB?

4. Consider the binary modulation scheme and obtain the bit error rates for the following averaged Rayleigh faded SNR values $\gamma \in \{12, 24, 36\}$ dB. Obtain the fraction of time that the SNR is less than 9 dB. To calculate the bit error rates (BER) and packet error probabilities, and to analyze Rayleigh fading, we can use the Q-function approximation and relevant formulas.

5. Consider a network with 100 users over single link with $C = 10$Mbps. Each user is active with probability 0.1 and transmit rate of 100kbps when active. Let $X_i$ denote the transmission rate of user $i$. We note that $X_i = 100$kbps if user $i$ is active and 0 otherwise. Find the probability of aggregate transmission rate over all users exceeds the link capacity $C$.
   **Hint**: Use Markov inequality.