Homework 1

Part I. **Problems** of **Chapter 1** in the textbook.

    P5, P6, P13, P14, P20, P25, P31

Part II. Additional problems.

   II.1   Suppose that users share a 3 Mbps link. Also suppose each user requires 150 kbps when transmitting, but each user transmits only 10 percent of the time.

    (a) When circuit switching is used, how many users can be supported?

    (b) For the remainder of this problem, suppose packet switching is used. Find the probability that a given user is transmitting.

    (c) Suppose there are 120 users. Find the probability that at any given time, exactly n users are transmitting simultaneously. (Hint: Use the binomial distribution.)

    (d) Find the probability that there are 21 or more users transmitting simultaneously.

        Hint: Recall the central limit theorem. You may use the values: $\phi(0.74) = 0.7704, \phi(1.74) = 0.9591, \phi(2.74) = 0.9969, \phi(3.74) = 0.9999$, where $\phi(x)$ is the cumulative distribution function (cdf) of a standard normal random variable.