1. a) If $N$ people, including persons $A$ and $B$, are randomly arranged,
   
   1) in a line, what is the probability that $A$ and $B$ are next to each other?
   2) What would the probability be if the people were arranged in a circle?

   b) Compute the probability that, in the card game of Bridge, a hand of 13 cards contains

   1) the Ace and King of at least one of the 4 suits?
   2) all of at least 1 of the 13 denominations, or face values?

2. A language teacher is responsible for teaching two sections of high school Seniors in a French class at Dixon High School. One of the sections has 30 students, consisting of 15 that are very good students, 10 that are fair students, and 5 that are poor students. The second section also has 30 students, but consist of only 5 that are very good students, 10 that are fair students, and 15 that are poor students. One cold and rainy winter day, the teacher becomes ill and can not make it to school. A substitute teacher is brought in and given the two sections to teach. She is aware of the numbers given above, but has no idea which section is which. She examines one student, selected at random, from each section and finds that the student from section '1' is a fair student, whereas the student from section '2' is a poor student, what is the probability that section '1' is the superior section (i.e. the section with 15 very good students)?

3. From his experience, Tom Jones estimates that 7% of the packages he mails will not reach their destination. He has bought two books for $20 each and wants to mail these to his brother who lives across the country. If he sends them in one package, the postage will be $5.20, but if he sends them in two separate packages, the postage will be $3.30 for each book. To minimize the expected value of his expenses (loss plus postage), which way is preferable to send the books? Justify your answer.
4. a) In a time-sharing computer system, the number of teleport inquiries average 0.2 per milli-second, and follows a Poisson probability law.
   1) Find the probability that no inquiries are made in the next milli-second.
   2) Find the probability that no inquiries are made during the next 3 milli-seconds.

b) An auditor checking the accounting practice of a firm samples three accounts from an accounts receivable list of eight. Find the probability that the auditor sees at least one past due account if there are:
   1) two such accounts among the eight.
   2) four such account among the eight.
   3) seven such accounts among the eight.

5. Two athletic teams play a series of ping-pong games for the league championship; the first team to win 4 games is declared the champion. Suppose that one of the teams is stronger than the other and wins each game it plays with probability 0.6, independent of the outcome of the other games.

   a) Find the probability that the stronger team wins the series in exactly $i$ games.

   b) Suppose, now, that the two teams are evenly matched and each has the probability of $\frac{1}{2}$ of winning each game. Find the expected number of games played for the championship.