MA 162 **Russell Brown**
Exam 3 **23 April, 1993**

Answer all of the following questions. Use the backs of the question papers for scratch paper. Additional sheets are available if necessary. No books or notes may be used. When answering these questions, please be sure to 1) check answers when possible, 2) clearly indicate your answer and the reasoning used to arrive at that answer **(unsupported answers will receive NO credit)**, and 3) label all variables and equations.

Question	Score	Total
1		20
2		20
3		20
4		20
5		20
Total		100

Name ______________________________

Section ________________

1. a) Compute:

(i) The number of three letter words which can be formed using the letters in 'BROWN' if we do not allow repeated letters.

ii) The number of three letter words which can be formed using 'BROWN' if we do allow repeated letters.

iii) The number of four letters words which can be formed by using the four letters in 'TOOT'.

b) Using a tree, list all of the ways that Boston and Los Angeles can play a best of three series. How many different possibilities are there?

2. a) A coin is flipped 5 times. What is the probability of obtaining at least one head?

b) Suppose that we roll two dice. What is the probability that the first die is a 3 or the second die is a 5?

3. Suppose that A and B are events with $P(A) = 0.5$, $P(B) = 0.6$ and $P(A \cup B) = 0.7$.

a) What is $P(A \cap B)$?

b) Complete the definition: The events A and B are independent if ____________________.

c) Using the definition you gave in b) determine if the events A and B are independent.

4. Suppose that a carnival game involves attempting five free throws. Assume that the probability of making one free throw is 0.4.

   a) What is the probability of making exactly five throws?

   b) Suppose that a prize of \$20 is given to players making all five free throws and a prize of \$5 is given to those who make exactly four free throws. What should they charge to play this game in order to break even?

5. Disease X is found in 20% of the patients at a clinic. There is a test for disease X which is known to give a positive result (indicating the presence of disease X) in 80% of the ill patients and is also positive in 25% of the patients who do not have disease X.

a) Let I denote the event of patients with disease X and let $+$ and $-$ denote the events of patients who test positive and negative. Draw a tree which summarizes the above information and then compute $P(I \cap +)$ and $P(I' \cap -)$.

b) Suppose that a patient tests positive. What is the probability he or she has disease X?