M1S TUTORIAL SHEET : WEEK 2

The following examples can be used to illustrate simple ideas of sample spaces, individual sample outcomes, set theory notation and operations and events.

1. A family contains two children of different ages; let F denote that a child is female, and M that a child is male, and suppose that the pair FM denotes that the younger child is female, the older is male, and so on.

(a) List the points in the sample space describing possible family compositions.

(b) Let A denote the subset of possibilities containing no males, B denote the subset containing two males, and C denote the subset containing at least one male. List the elements of A, B, C, $A \cap B$, $A \cup B$, $A \cap C$, $A \cup C$, $B \cup C$ and $B' \cap C$.

2. Two dice are thrown; let Ω be the sample space of possible outcomes, which correspond to pairs of values (e.g. (2,3), (6,1), (4,4)) indicating the scores on the first and second die respectively. Let A denote the subset of Ω containing outcomes in which the score on the second die is even, B denote the subset of outcomes for which the sum of scores on the two dice is even, and let C denote the subset of outcomes for which at least one of the scores is odd.

List the elements of A, C', $A \cap B$, $A \cap B'$, $A' \cup B$ and $A' \cap C$.

3. A computer hardware company manufactures five apparently identical terminals, two of which are actually defective. An order for two terminals is received, and is filled by selecting two of the five.

(a) List the elements of the sample space corresponding to how the order is filled.

(b) Let A denote the event that the order is filled with two non-defective terminals. List the sample points in A.