ECNO4004: Mathematical Statistical Economics

Problem Set 1

1. If $S=\{1,2,3,4,5,6,7,8,9\}$, $A=\{1,3,5,7\}$, $B=\{6,7,8,9\}$, $C=\{2,4,8\}$ and $D=\{1,5,9\}$, list the elements of the subsets of S corresponding to the following events:

(1) $\bar{A}\cap B$; (2) $\left(\bar{A}\cap B\right)\cap C$; (3) $\bar{B}\cup C$; (4) $\left(\bar{B}\cup C\right)\cap D$;

(5) $\bar{A}\cap C$; (6) $\left(\bar{A}\cap C\right)\cap D$;

2. Explain why there must be a mistake in each of the following statements;

(1) The probability that it will rain is 0.67 and the probability that it will rain or snow is 0.55.

(2) The probability that a student will get a passing grade in English is 0.82 and the probability that she will get a passing grade in English and French is 0.86.

(3) The probability that a person visiting a zoo will see the giraffes is 0.72, the probability that he will see the bears is 0.84, and the probability that he will see both is 0.52.

3. Consider two events A and B with $P(A)=0.5$ and $P(B)=0.7$. Determine the minimum and maximum values of $P(A\cap B)$ and the conditions under which each is attained.

4. A balanced die is tossed twice. If A is the event that an even number comes up on the first toss, B is the event that an even number comes up on the second toss, and C is the event that both tosses result in the same number, are the events A, B and C are independent?

5. Suppose that $P(A)=0.7,\quad P(B)=0.5$, and $P\left(\overline{A\cup B}\right)=0.1$.

(1) Find $P\left(A\cap B\right)$.

(2) Give $P(A|B)$

(3) Give $P(B|A)$.