Homework 1

1: Suppose that evens A and B are mutually exclusive with probabilities $P(A) = 0.3$ and $P(B) = 0.4$, respectively. Calculate the following probabilities $P(\overline{A})$, $P(\overline{B})$, $P(AB)$, $P(A \cup B)$, $P(\overline{A}B)$, $P(\overline{A}\overline{B})$, $P(\overline{AB})$, and $P(\overline{A} \cup \overline{B})$.

2. Suppose that the sample space is $S = \{1,2,3,4,5,6\}$. Let $A = \{2,4\}, B = \{1,2,6\}$. Calculate the following events $A - B$, $B - A$, AB, $A\overline{B}$, $A \cup B$, $\overline{A \cup B}$

3. Suppose that a box contains a white and b black balls. Now, a sequence of selecting balls from those balls is performed, and only one ball is selected for each time without replacement. Find the probabilities of the following events:

(1) Select $m + n$ balls at random, there are exactly m white balls and n black balls, where ($m \leq a$, $n \leq b$);

(2) White balls are not selected until the kth time;

(3) The kth selected ball is white.