Events and Probabilities:

1. In how many ways can we draw five cards from an ordinary deck of 52 cards (a) with replacement; (b) without replacement?

2. Suppose in a state, licence plates have three letters followed by three numbers, in a way that no letter or number is repeated in a single plate. Determine the number of possible licence plates for this state.

3. Suppose we pick a letter at random from the word TENNESSEE. What is the sample space? and what probabilities should be assigned to the outcomes?

4. Given two events $A$ and $B$ with $P(A) = 0.4$ and $P(B) = 0.7$. What is the maximum and minimum possible values for $P(A \cap B)$?

5. Prove that (use induction)

\[
P\left( \bigcup_{j=1}^{n} A_j \right) \leq \sum_{j=1}^{n} P(A_j).
\]

6. Prove that

\[
P\left( \bigcap_{j=1}^{n} A_j \right) \geq 1 - n + \sum_{j=1}^{n} P(A_j).
\]