MATH 464 (THEORY OF PROBABILITY)
HOMEWORK 1

FALL 2017

Due on: Thursday 08-31-2017.

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 $\mathbb{P}(A) = 0.4$ and $\mathbb{P}(B) = 0.7$. What is the maximum and minimum possible values for $\mathbb{P}(A \cap B)$?

(5) Prove that (use induction)

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

(6) Prove that

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