

**MATH 464 (THEORY OF PROBABILITY)  
HOMEWORK 2**

SPRING 2019  
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**Combinatorics and Probability**

- (1) A domino is an ordered pair  $(m, n)$  with  $0 \leq m \leq n \leq 6$ . How many dominoes are in a set if there is only one of each?
- (2) A club with 50 members is going to form two committees, one with 8 members and the other with 7. How many ways can this be done if the committees must be disjoint?
- (3) Six students, three boys and three girls, lineup in a random order for a photograph. What is the probability that the boys and girls alternate?
- (4) A fair coin is tossed 10 times. What is the probability of (a) five Heads; (b) at least five Heads?
- (5) Four people are chosen randomly from 5 couples. What is the probability that two men and two women are selected?
- (6) In how many ways can we draw five cards from an ordinary deck of 52 cards (a) with replacement; (b) without replacement?
- (7) 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.
- (8) 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?
- (9) Eight people are divided into four pairs to play bridge. In how many ways can this be done?
- (10) If  $n$  distinguishable balls are randomly placed into  $n$  cells (so that more than one ball can be placed in a cell), what is the probability that each cell will be occupied?
- (11) The probability that two given hands in bridge contains  $k$  aces between them is  $\binom{4}{k} \binom{48}{26-k} / \binom{52}{26}$ . Explain how?
- (12) Find the probability that a hand in bridge contains 5 spades, 5 hearts, and 3 clubs.