

## Homework Assignment #1

Due Date, ~~Monday 9/11~~ *Wednesday 9/13*

No formal proofs are necessary on this assignment, but you must give exact numerical answers and show how they were obtained.

(1) Let  $S = \{1, 2, \dots, 30\}$ .

- How many sets of 3 distinct number may be chosen from  $S$ ?
- How many sets of 3 distinct numbers may be chosen from  $S$  that contain no two consecutive numbers?
- How many sets of 4 numbers may be chosen from  $S$  which contain two odd numbers and two even numbers?

(2) In how many ways can 5 indistinguishable rooks be placed on an  $8 \times 8$  chessboard so that no two rooks are attacking each other?

In how many ways may these non-attacking rooks be placed so that the first row contains a rook and the second column contains a rook?

In how many ways may these non-attacking rooks be placed so that neither the first row nor the second column contains a rook?

(3) Consider a standard deck of 52 playing cards along with two more cards: a red joker and a black joker. For the purposes of poker hands, a joker is a wild card, that is, it may act in the place of any one of the standard 52 cards. We will draw a 5-card had from this deck of 54 cards.

- How many 5-card hands are there?
- How many 5-card hands contain a full house but no better?
- How many 5-cards hands contain a straight flush (a royal flush is considered to be a straight flush)?

(4) Determine the number 11-permutations of the multi-set  $\{3 \cdot a, 4 \cdot b, 5 \cdot c\}$ . Determine the number of 10-permutations of the multi-set  $\{3 \cdot a, 4 \cdot b, 5 \cdot c\}$ .

(5) Three packages of cookies are available: oatmeal, chocolate chip, and shortbread. In how many ways can one cookie be placed on 10 identical white plates?