

Homework 5

Due Friday, September 21 at the beginning of class

Reading. Sections 3.5, 3.6, 4.1, 4.2

Remark. Make grammatically correct sentences by adding in just a few English words (for problems 1-4, but not for problem 5).

Problems.

- (a) How many different anagrams (i.e. strings of length 10) can you form by rearranging the letters of the word HORSETOOTH? For example, THEHOSROOT and SOOOTHHER are two such rearrangements.
(b) How many ways are there to place 8 rooks on a chessboard with no two attacking each other if 4 are wooden, 2 are marble, and 2 are plastic? Rooks made from the same material are indistinguishable.

2. Prove by induction that $2^n \geq 10n + 7$ for all $n \geq 7$.

3. You want to buy a bouquet of 12 flowers, and there are 5 different kinds of flowers to choose from. Any two flowers of the same kind are indistinguishable, and buying 10 roses and 2 tulips gives the same bouquet as buying 2 tulips and 10 roses. How many different bouquets could you buy?

4. This last question is a “short answer” question, meaning no English words or explanations are required. Simply write down the correct mathematical expression.

How many ways are there to distribute 20 pillows to 12 (distinguishable) people if ...

- ... the pillows are identical?
- ... the pillows are identical and every person must get at least one?
- ... the pillows are distinguishable and it is not required that every person get one? For example, we could give all 20 pillows to the first person.
- ... the pillows are distinguishable and we give 2 pillows to persons A,B,C,D,E,F,G,H (the first 8 people), and 1 pillow to persons I,J,K,L (the last four people)?