

Homework 2

Due Friday, September 4 at the beginning of class

Reading.

Sections 1.3, 1.5, 1.6, 1.7

Remark. Your answers should be briefly explained. If you're only writing math symbols, then you're not explaining things — make grammatically correct sentences by adding in just a few English words. For example, suppose the assigned problem were “Solve $x^2 - 3x + 2 = 0$.” The answer

$$x^2 - 3x + 2 = 0 \quad (x - 1)(x - 2) = 0 \quad x = 1 \text{ or } x = 2,$$

would not make me 100% happy, but the following answer would:

“Since $x^2 - 3x + 2 = 0$ implies $(x - 1)(x - 2) = 0$, we have $x = 1$ or $x = 2$.”

Note we added only four English words. As a second example, suppose the problem were “How many ways can 47 students sit in 47 seats?” I would not be 100% happy with the answer “47!”, but I would be happy with “Since there are 47 ways to choose the student in the first seat, 46 ways to choose the student in the second seat, etc, there are 47! ways.”

Problems.

1. Starting from Washington DC, in how many ways can you visit 5 of the 50 state capitals? The trip

DC \rightarrow Sacramento \rightarrow Dover \rightarrow Baton Rouge \rightarrow Bismarck \rightarrow Denver

is certainly different (and much longer) than the trip

DC \rightarrow Dover \rightarrow Baton Rouge \rightarrow Denver \rightarrow Bismarck \rightarrow Sacramento.

2. You have 4 extra concert tickets and 6 friends. How many different combinations of 4 friends could you invite to the concert?
3. How many ways are there to group 10 people into five pairs of two?
4. What is the difference $A \setminus B$ if
 - (a) A is the set of primes and B is the set of odd integers?
 - (b) A is a subset of B , i.e. $A \subseteq B$?
5.
 - (a) Find the number of all 4-digit strings of letters. String $abcd$ is different from $acbd$.
 - (b) Find the number of all 4-digit strings of letters in which no two consecutive letters are the same. For example, strings $xdwa$ and $xdxd$ count but strings $xdww$ and $xddx$ do not.