

Homework 2

Due Friday, September 2 at the beginning of class

Reading.

Sections 1.3, 1.5, 1.6, 1.7 (we're skipping Section 1.4)

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. There are 8 fall semester classes that you are considering, and you want to take 3 of them. How many different course schedules could you create by enrolling in 3 of these 8 classes?
2. Starting from Fort Collins, CO, in how many ways can you visit 4 of the 14 countries in South America? The trip

Fort Collins \rightarrow Brazil \rightarrow Venezuela \rightarrow Suriname \rightarrow Uruguay

is certainly different than the trip

Fort Collins \rightarrow Suriname \rightarrow Uruguay \rightarrow Venezuela \rightarrow Brazil.

3. (a) What is $\mathbb{Z} \setminus \mathbb{N}$, where \mathbb{Z} is the set of integers and \mathbb{N} is the set of positive integers?
(b) What is $A \setminus B$ if $A \cap B = \emptyset$?
(c) What is $|A \cup B|$ if $|A| = 10$, $|B| = 7$, and $|A \cap B| = 3$?

4. How many ways are there to group 16 people into eight pairs of two?
5. (a) Find the number of all 6-digit strings of letters. String $abcdef$ is different from $acbdfe$.
- (b) Find the number of all 6-digit strings of letters in which letters which differ by one slot are not the same, and also letters which differ by two slots are not the same. For example, string $xwzzrx$ does not count since there are z 's which differ by one slot, string $xwzrzx$ does not count since there are z 's which differ by two slots, but string $xzwrzx$ is okay.