[Get 75% of students to turn on cameras]

Please submit homework as a SINGLE FILE. If you need to update it, include EVERYTHING in the update. (I hear that if you want to turn a bunch of photos into a single PDF, some great software to use is “ilovepdf”. Have any of you used it? Other ideas?)

Please use scans, not photos.

Be careful about submitting HW by phone. However you submit, be sure to CHECK that your homework made its way onto Blackboard.

Thanks for all your great participation on Piazza!

Section 2.1: Basic Counting Techniques - The Rule of Products

- Apply the rule of products to basic counting problems.

Questions on section 2.1?

Group work: 2.1.12

How many integers from 100 to 999 can be written in base ten without using the digit 7?

Group work: 2.1.13

Consider three persons, A, B, and C, who are to be seated in a row of three chairs. Suppose A and B are identical twins. How many seating arrangements of these persons can there be

(a) If you are a total stranger? (b) If you are A and B's mother?

This problem is designed to show you that different people can have different correct answers to the same problem.

Section 2.1: Basic Counting Techniques - The Rule of Products

- Apply the rule of products to basic counting problems.

Other questions on section 2.1?

Section 2.2: Permutations

- Know basic terminology: permutations, factorial
- Recognize when permutations occur in counting problems, and use the appropriate formula to compute the number of permutations.

Questions on section 2.2?

Group work: 2.2.4

Let A be a set with $|A| = n$. Determine

(a) $|A^3|$

(b) $|\{(a, b, c) \mid a, b, c \in A \text{ and each coordinate is different}\}|$

Note: “Let A be a set with $|A| = n$” usually means “Let A be an arbitrary set with $|A| = n$”. You can’t just take A to be some particular set with n elements and prove that the claim holds in that one case. By way of comparison, later on I might ask a question like “Let n be an odd number. Show that $n+1$ must be even.” You would NOT get credit if you wrote “Okay, I’ll let $n=3$, which is odd. Then $n+1=4$, which is even.” I would want to see an argument like this: “Suppose n is odd. Then n is of the form $2k+1$. So then $n+1$ is of the form $2k+2$, which can be written as $2(k+1)$, so it is even.”

Group work: 2.2.6(a)

Consider the three-digit numbers that can be formed from the digits 1, 2, 3, 4, and 5 with no repetition of digits allowed.

a. How many of these are even numbers?

..?..

Choose the last digit first: it must be in {2,4}.

Then there are 5–1=4 possibilities for the second-to-last digit and 4–1=3 possibilities for the first digit.

So there are $2 \times 4 \times 3 = 24$ possibilities.

Group work: 2.2.6(b) (10 minutes)

6. Consider the three-digit numbers that can be formed from the digits 1, 2, 3, 4, and 5 with no repetition of digits allowed.

a. How many of these are even numbers?

b. How many are greater than 250?

..?..

(b) Leaving aside the three numbers 251, 253, and 254, all the numbers that we are trying to count are bigger than 300.

To specify one of these numbers,

we first pick an initial digit in {3,4,5},

then we pick one of the 5–1=4 remaining digits for the second digit,

and then we pick one of the 4–1=3 remaining digits for the third digit.

Thus there are $3 \times 4 \times 3 = 36$ such numbers.

Adding in the 3 numbers that were under 300,

we get 36+3=39 as the total.

(This solution uses the "Law of Addition"

$|A \cup B| = |A| + |B|$, which holds whenever A and B are disjoint; when they're not, we'll need something fancier.)

Section 2.2: Permutations

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- Recognize when permutations occur in counting problems, and use the appropriate formula to compute the number of permutations.

Other questions on section 2.2?