MATH3250 COMBINATORICS READING HW 4

Instruction. Please submit all questions. Both handwritten or typed solutions are accepted.

You are encouraged to discuss the problems with other people in or outside of class. You are also welcome to come see me to show me what you've done so far.

You would need the second chapter of Bóna's "A Walk Through Combinatorics" textbook (4th, 3rd, or 2nd Ed.)

1. Optional: Sec 2.1 Quick Check

(1) Let $a_0 = 1$ and let $a_{n+1} = 4a_n + 1$ for all nonnegative integers n. Prove *using induction* that for all nonnegative integers n, the equality

$$a_n = \frac{4^{n+1} - 1}{3}$$

holds.

(2) *Use induction* to prove that if $a_n = 1 + 2 + \cdots + n$, then

$$a_n = n(n+1)/2$$

for all positive integers n.

2. Sec 2.2 Strong Induction

(1) Copy the algorithm of strong induction (from the first page of Sec 2.2 Strong Induction).

(2) Write down the explanation (from the book, pg 30) for why the method of induction is valid. Add a few extra phrases and sentences to the book's explanation.

3. Book Example

Complete at least one of the following.

(1) Go to Example 2.5 and attempt to solve it on your own. Then use the book's solution to improve your answer.

(2) Go to Example 2.6 and attempt to solve it on your own. Then use the book's solution to improve your answer.

Attempt presentation problems (Don't submit)

Attempt all presentation problems for week 2:
egunawan.github.io/combinatorics/hw/wk2problems.pdf

Some of the questions will be picked for presentation problems and for future homework / exam questions.

4. Survey

i. Approximately how much time did you spend on this homework?

ii. Write down the resources (for example, Bóna's textbook or a math.stackexchange.com/ page) you referenced and the people that you talked with.

iii. Any questions about this homework?