

Math 330 Section 1 - Fall 2016 - Homework 02

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Last submission Friday(!), September 16, 2016

Running total: nn points

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete by this date.

B/G (Beck/Geoghegan) Textbook:
ch.1

MF lecture notes:
ch.1
ch.2.1, ch.2.2

B/K lecture notes (optional reading – good for examples, improved understanding):
ch.1, section 1

New reading assignments:

Reading assignment 1 - due Tuesday, September 6:

- a. Read carefully all of ch.2 of B/G. Remember: Last Friday I already discussed ch.2.1 and 2.2 and we covered the induction principle and did a proof by induction.
- b. Read **extra carefully and repeatedly** everything in ch.2.3 (induction) starting with thm.2.17 up to and including the “template for proofs by induction”! I shall nickle-and-dime you on correctly writing down proofs that use induction and it is a **100% certainty** that such proofs will appear on some of the exams and the final!
Some advice: Don't skip the margins on top of p.20 (the “ladder principle”) because they help deepen your intuitive grasp of how proofs by induction work.
- c. Finish MF ch.2: A new chapter 2.3: “Addenda to chapter 2” was added to the MF document (version 2016-09-02). It currently consists only of a single definition and a proposition without proof (half a page).

Be prepared to take a quiz which asks for everything asked for in previous assignments PLUS the important stuff of B/G ch.2.1 - 2.3:

- Axiom 2.1, the definitions of \mathbb{N} , of **natural numbers, positive integers, negative integers**,
- the definitions of **Law of the Excluded Middle**, $a < b$, $a \leq b$, $a > b$, $a \geq b$, **less than, less than or equal to, greater than, greater than or equal to**,
- the definitions of **equality of sets**, $A \subseteq B$, $A \supseteq B$, **digits, base case, induction step**
- B/G ch.2.3: Axiom 2.15, all theorems (thm.2.17 and 2.25) and their names (don't confuse induction axiom and induction principle) and all core propositions: 2.14, 2.16, 2.20 - 2.22

Reading assignment 2 - due Wednesday, September 7:

Read carefully B/G ch.3 on logic.

Be prepared to take a quiz which asks for everything asked for in previous assignments PLUS the important stuff of B/G ch.2.4 (which you were supposed to have read by the day before):

- The one theorem (thm.2.32) and its name and props 2.33, 2.34.
- You **need not worry** about having $S = \{k \in \mathbb{N} : k = mx + ny \text{ for some } x, y \in \mathbb{N}\}$ and $\gcd(m, n) = \min(S)$ on any quiz or exam until we do the Euclidian division algorithm in B/G ch.6.

Reading assignment 3 - due Friday, September 9:

Read carefully ch.4 (Functions and relations) of the MF document until before ch.4.2.2 (Definition of a function and some basic properties).

General note on written assignments: Unless expressly stated otherwise, to prove a proposition or theorem you are allowed to make use of everything in the book up to but NOT including the specific item you are asked to prove.

Written assignment 1:

Use everything up to AND including B/G prop.2.2 to prove B/G prop.2.3: $1 \in \mathbb{N}$.

Written assignment 2:

Use everything up to AND including prop.2.4, to prove that if $k \in \mathbb{Z}$ then $k + 1 > k$. Hint: Use prop.2.3.

GOOD NEWS: When you do assignments from chapter 2 and later chapters you need no longer justify the rules of arithmetic given to you in ch.1. No more worry about commutativity of “+” and “.” and the need for parentheses to group more than two terms. You may even use the “general laws of associativity”: Given any finite sum of integers such as $(m_1 + m_2) + (n_1 + n_2)$ you may regroup the parentheses and even drop them. The same is true for products.