Math 330 Section 1 - Fall 2016 - Homework 01

Due date: Monday, August 29, 2016 *Running total: 5 points*
Last submission Monday, September 12, 2016

General note on reading assignments: Each reading assignment usually has its individual due date. Take it seriously: You may have an unannounced quiz this coming Wednesday about reading assignment 1. This is the fourth time that I am teaching this class and my experience is that many students are not even able to reproduce the relatively few definitions given in the assigned reading. If you do not learn the material properly then your grades will suffer.

Reading assignment 1 - due Monday, August 29: Read ch.1: Before you start of the MF document
Read carefully ch.1 of B/G through prop. 1.17.

Reading assignment 2 - due: Tuesday, August 30: Read ch.2.1 (Sets and basic set operations) of the MF document. You should have been exposed to almost all of the material. You can find plenty of examples in ch.1, section 1 of B/K (Introduction to Sets).

Reading assignment 3 - due Wednesday, August 31: Read carefully the remainder of ch.1 in B/G.

Be prepared to take a quiz on Tuesday or Wednesday which asks for
axioms 1.1 - 1.5,
the meaning of "$x \in A$" when A is a set,
reflexivity, symmetry, transitivity and the replacement principle for "$=$",
the meaning of "if A then B" for statements A and B
the definition of "$p|q$"
the definition of "even" integers
the definition of "$x - y$"

Propositions in B/G you should be able to write down (not how to prove them):
prop.1.10, prop.1.12, prop.1.13 (how do those last two differ?), prop.1.18, prop.1.19, prop.1.23, prop.1.26

Reading assignment 4 - due Friday, September 2: Read carefully the remainder of ch.1 in B/G.
Read ch.2.2 (Numbers) of the MF document. The material starting at def.2.11 (Principle of proof by mathematical induction) will be challenging to you. Try the best you can to understand how this principle is used in the Proof of the triangle inequality for n real numbers.

As is true for all the additional readings, be prepared to encounter different notation in the book and in lecture. In lecture you will see
$A \setminus B$ instead of $A - B$ for the set difference,
$A \Delta B$ instead of $A \oplus B$ for the symmetric set difference,
Ω instead of S or U for the universal set,
$A^{\complement}$ or A^c instead of $\bar{A}$ for the complement.

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. Example: assignment 5 below: to prove prop.1.11 (iv) you may use everything up to and including prop.1.11 (iii).

Written assignment 1:

Prove Prop.1.8: Let $a \in \mathbb{Z}$. Then $(-a) + a = 0$.

Written assignment 2:

Prove Prop.1.10: Let $a, x_1, x_2 \in \mathbb{Z}$. If both $a + x_1 = 0$ and $a + x_2 = 0$ then $x_1 = x_2$.

Written assignment 3:

Prove Prop.1.11(ii), part 1: Let $a, b, x, y \in \mathbb{Z}$. Then $a + \big(b + (x + y)\big) \ = \ (a + b) + (x + y)$

Written assignment 4:

Prove Prop.1.11(ii), part 2: Let $a, b, x, y \in \mathbb{Z}$. Then $(a + b) + (x + y) \ = \ \big(a + (b + x)\big) + y$

Obviously you'll have to utilize ax.1.1(ii) to prove #3 and #4. Tell me me what you plug in for m, n, p in that axiom.

Written assignment 5:

Prove Prop.1.11(iv): Let $x, y, z \in \mathbb{Z}$. Then $x(yz) \ = \ z(xy)$