

Math 330 Section 5 - Fall 2023 - Homework 07

Published: Tuesday, September 19, 2023
Last submission: Friday, October 6, 2023

Running total: 30 points

Status - Reading Assignments:

Here is the status of the reading assignments you were asked to complete before the first one of this HW.

MF lecture notes:

ch.2.1 – 2.7, ch.3, skim ch.4 (optional), ch.5 - 6.5

B/G (Beck/Geoghegan) Textbook (optional, EXCEPT for ch.3 on logic):

ch.1 – 2.3, ch.3

B/K lecture notes:

ch.1.1 (Introduction to sets) (optional)

ch.1.2 (Introduction to Functions) but skip ch.1.2.4: Floor and Ceiling Functions (optional)

New reading assignments:

Reading assignment 1 - due Monday, September 25:

- a. Review B/G ch.2.4 through Prop.2.33 and skip the remainder of B/G ch.2.
- b. Carefully read MF ch.6.6 – 6.8

Reading assignment 2 - due: Wednesday, September 27:

- a. Review BG ch.5 and ch.6.1. You have seen all of the material in MF ch.5.
- b. Read carefully MF ch.6.9.

Reading assignment 3 - due Friday, September 29:

- a. Read carefully MF ch.6.10-6.12.
- b. Review the remainder of BG ch.6. This all has been covered in MF ch.6.9–6.12.

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:

Prove B/G Prop. 4.7(i) by induction: Let $k \in \mathbb{N}$. Then there exists $j \in \mathbb{Z}$ such that $5^{2k} - 1 = 24j$. In other words, $24 \mid (5^{2k} - 1)$.

Written assignment 2:

Let $x_0 = 8$, $x_1 = 16$, $x_{n+1} = 6x_{n-1} - x_n$ for $n \in \mathbb{N}$.

Prove that $x_n = 2^{n+3}$ for every integer $n \geq 0$.

Hint: Use strong induction.