

## Math 330 Section 6 - Spring 2020 - Homework 07

Published: Thursday, February 13, 2020  
Last submission: Wednesday, March 4, 2020

Running total: 33 points

**Update February 7, 2020**

Deadline extended from Friday, February 28, 2020, to Wednesday, March 4, 2020.
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### 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 – 6

MF lecture notes:  
ch.2, ch.3, ch.5, ch.6.1 – 6.11

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, February 24:

- a. Read carefully the remainder of MF ch.6.

#### Reading assignment 2 - due: Wednesday, February 26:

- a. Carefully read MF ch.7.1 – 7.2.
- b. Carefully read the remainder of MF ch.7.

#### Reading assignment 3 - due Friday, February 28:

- a. Carefully read MF ch.8.1, 8.3, and 8.4. Note that the content of ch.8.4 which follows prop.8.10 is optional.

#### Written assignment 1:

Prove prop.6.7.c: Let  $\beta \in \mathbb{Z}$  and  $k, m \in \mathbb{Z}_{\geq 0}$ . Then  $(\beta^m)^k = \beta^{mk}$ .

**Hint:** Use induction on  $k$ .

#### Written assignment 2:

Prove MF prop.5.5a: Let  $X, Y, Z \neq \emptyset$ . Let  $f : X \rightarrow Y$  and  $g : Y \rightarrow Z$  be injective. Then  $g \circ f$  is injective.

#### Written assignment 3:

Prove prop.5.9.a: Let  $X, Y \neq \emptyset$ , and let  $f : X \rightarrow Y$  be bijective. Let  $\emptyset \neq A \subseteq X$ ,  $B := f|_A(A) = \{f(a) : a \in A\}$ .

<sup>1</sup> Let  $f' : A \rightarrow B; x \mapsto f(x)$ , i.e.,  $f' = f|_A$ , except that we have shrunken the codomain  $Y$  to  $B$ . Then  $f'$  is bijective.

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<sup>1</sup> i.e.,  $B = f(A)$