

## Math 330 Section 1 - Spring 2016 - Homework 06

*Due date: February 18, 2016*  
*Last submission March 2, 2016*

*Running total: 27 points*

### Status - Reading Assignments:

Here is the status of the reading assignments you were previously asked to complete:

B/G (Beck/Geoghegan) Textbook:  
all of ch.1 - ch.5

Other course material:

“Logic part 1”  
“Sets part 1”, “Sets part 2”,  
“Functions part 1”, “Functions part 2”  
“MF additional material”, ch.2 - ch.3

**New reading assignments: NONE**, but be sure you have learnt all of the previously assigned material on sets and functions. The material from the MF document is fair game for quizzes and exams!

**Written assignment 1:** Given are four sets  $A, B, C, D$ . prove that

- a.  $(A \times B) \cap (C \times D) \subseteq (A \cap C) \times (B \cap D)$ ,
- b.  $(A \times B) \cap (C \times D) \supseteq (A \cap C) \times (B \cap D)$ .

### Assignment 2:

Given are four sets  $A, B, C, D$ . prove that

$$(A \times B) \cup (C \times D) \subseteq (A \cup C) \times (B \cup D).$$

### Assignment 3:

Given are four sets  $A, B, C, D$ . Give a **counterexample** to the following:

$$(A \times B) \cup (C \times D) \supseteq (A \cup C) \times (B \cup D).$$

In other words, the two expressions on the left and the right are **not** always equal. For the counterexample choose “singleton sets”  $A = \{a\}, B = \{b\}, C = \{c\}, D = \{d\}$ .