

## Homework 5

Due on Friday, 6/9, 1:15 PM in class

Name \_\_\_\_\_ PID \_\_\_\_\_

**Honor Code Pledge:** I certify that I am aware of the Honor Code in effect in this course and observed the Honor Code in the completion of this homework.

Signature \_\_\_\_\_

(48') 1. Let  $A, B, C$  be three sets such that  $A = \{a, b\}$ ,  $B = \{a, b, c\}$ ,  $C = \{a, b, \{a, b, c\}\}$ . Also, we let  $\emptyset$  denote the empty set. Answer the following questions. Your answer can be just "Yes" or "No."

- |                          |  |
|--------------------------|--|
| (a) Is $A \in B$ ?       | (g) Is $\emptyset \in C$ ?                   |
| (b) Is $A \subseteq B$ ? | (h) Is $\emptyset \subseteq C$ ?             |
| (c) Is $B \in C$ ?       | (i) Is $\emptyset = 0$ ?                     |
| (d) Is $B \subseteq C$ ? | (j) Is $\emptyset = \{\emptyset\}$ ?         |
| (e) Is $A \in C$ ?       | (k) Is $\emptyset \in \{\emptyset\}$ ?       |
| (f) Is $A \subseteq C$ ? | (l) Is $\emptyset \subseteq \{\emptyset\}$ ? |

(12') 2. Write the resulting set of each of the following expressions.

- (a)  $\{a, \{b, c\}\} \cup \{\{a, b\}, c\}$
- (b)  $\{\{1, 2, 3\}, \{4, 5\}\} \cap \{\{1, 2\}, \{3, 4, 5\}\}$
- (c)  $\{\{s, t, x\}, y, z\} - \{s, t, x, y, z\}$

(8') 3. Suppose the universal set is the set of real numbers. Write the complement of the following intervals. (Write the solution also in the interval form, i.e., using "(", ")", "[", and/or "]".)

- (a)  $(-1, 3]$
- (b)  $(2, \infty)$

(8') 4. Answer the following questions about sets and tuples by "Yes" or "No."

- (a) Is  $\{(1,2), (1,2,3)\} = \{(1,2,3), (1,2)\}$  ?
- (b) Is  $(\{1,2\}, \{1,2,3\}) = (\{1,2,3\}, \{1,2\})$  ?

(20') 5. Let  $A, B, C$  be three sets such that  $A = \{1, 2\}$ ,  $B = \{a, b\}$ ,  $C = \{1, 2, 3\}$ . Write the resulting set of each of the following Cartesian products.

- (a)  $A \times B$
- (b)  $B \times A$
- (c)  $B \times (A \cup C)$
- (d)  $(A \times B) \times C$
- (e)  $A \times B \times C$

(4') 6. Write the power set of  $\{x, \{y, z\}\}$ .