

# LING 610

## Homework 1: Novice level Due on Friday, September 14

### Guidelines

Read Heim & Kratzer, chapter 1, and Partee et al., chapters 1 and 2. Then do the exercises below. Please type your homework. Leave ample space for feedback (wide margins, leave back of pages blank). You are most welcome to work in groups. But formal exercises are in part finger exercises, so make sure you write down your own answers in a thoughtful way – that is, while you are writing, think about what you are writing. Please indicate who the other members of your group were.

For exercises 1 to 5, consider the following sets:

$$A = \{ \text{Boston}, \{ \text{Amherst} \}, 3, 7, \{ \text{Norah} \}, \text{Stella} \}$$

$$B = \{ x \mid x \text{ is a city in Massachusetts} \}$$

$$C = \{ x \mid x \text{ is a natural number} \}$$

$$D = \{ \text{Nina}, \text{Josie}, \text{Bea} \}$$

1. Are the following statements true or false?

(a)  $\text{Amherst} \in A$

(c)  $\{ \text{Amherst}, \text{Boston} \} \subseteq A$

(b)  $\{ \{ \text{Amherst} \} \} \in A$

(d)  $\{ \{ \text{Amherst} \}, \text{Boston} \} \subseteq A$

2. Using your world knowledge, specify the following sets by listing their members.

(a)  $\{ x \mid x \in A \text{ and } x \subseteq B \}$

(b)  $\{ x \mid x \in A \text{ and } x \in B \}$

(c)  $A \cap B$

(d)  $A - B$

(e)  $B \cap C$

(f)  $A - C$



Any binary relation  $R$  from a set  $A$  to a set  $B$  is a subset of  $A \times B$ . In our example, both of these sets happen to be the same, namely  $E$ . So any subset of  $E \times E$  qualifies as a binary relation in  $E$ . The set of all subsets of a given set is its power set, and from the discussion in PtMW 1.5, you know how to figure out the cardinality of the power set of a set with a given cardinality. Since you know the cardinality of  $E \times E$  from the previous exercise, you can figure out the number of possible binary relations on  $E$ .

**8.** For each set of ordered pairs below, say whether it is a mere relation or a function.

- (a)  $\{ \langle \text{Earth}, \text{Venus} \rangle, \langle \text{Mars}, \text{Jupiter} \rangle, \langle \text{Jupiter}, \text{Mars} \rangle, \langle \text{Saturn}, \text{Pluto} \rangle \}$
- (b)  $\{ \langle 1, 2 \rangle, \langle 3, 5 \rangle, \langle 2, 4 \rangle, \langle 1, 7 \rangle, \langle 2, 9 \rangle \}$
- (c)  $\{ \langle x, y \rangle \mid x < y \}$
- (d)  $\{ \langle x, y \rangle \mid y = x + 2 \}$

**9.** Heim & Kratzer: Exercise on pages 9/10.