

1. Exam 1

93 - 100	A+	10
89 - 92	A	4
86 - 88	A-	2
82 - 85	B+	4
76 - 81	B, B-	4
66 - 75	C	2
0 - 65	D - F	3

2. Ordered pairs and Cartesian products

Recall that members of a set are unordered: $\{a, b\} = \{b, a\}$.

We will want, however, a way to keep track of order when grouping things. For this, we introduce the notion of an *ordered pair*, written $\langle a, b \rangle$, in which a is the first member of the pair and b is the second member. Here, order is crucial:

$$(1) \langle a, b \rangle = \langle b, a \rangle \text{ iff } a = b.$$

We should note that ordered pairs can be defined using sets, as in (2).

$$(2) \langle a, b \rangle =_{\text{def}} \{\{a\}, \{a, b\}\}$$

Defining ordered pairs in terms of sets has the advantage of reducing the number of primitive notions. For our purposes, however, the only thing you need to know about ordered pairs is that order is crucial (i.e., that (1) holds.)

We can form ordered pairs out of two sets A and B by taking an element of A as the first member of the pair and an element of B as the second member.

The *Cartesian product* of A and B , written $A \times B$ is the set consisting of all ordered pairs whose first member belongs to A and whose second member belongs to B .

$$(3) A \times B =_{\text{def}} \{\langle x, y \rangle \mid x \in A \text{ and } y \in B\}$$

Practice: Assume the sets $A = \{\text{Saturn, Jupiter}\}$ and $B = \{1, 2\}$. What are:

- (a) $A \times B$; (b) $B \times A$; (c) $A \times A$

3. Relations

In set theory a *relation* is a set of ordered pairs.

“We have a natural understanding of relations as the sort of things that hold or do not hold between objects. For example, the verb *kiss* can be regarded as a relation between pairs of objects such that the first kisses the second.” [*Mathematical Linguistics*, Chapter 2].

For example:

$$(4) \text{ For any } s, \llbracket \textit{kiss} \rrbracket^s = \{\langle x, y \rangle \mid x \text{ kisses } y \text{ in } s\}$$

We write $R \subseteq A \times B$ for a relation between objects from two sets A and B , which we call a relation *from* A *to* B . A relation holding of objects from a single set A is called a relation *in* A . For example, the verb *kiss* denotes a relation in H , the set of humans.

4. Homework 5. Due Thursday, October 11th.

(i) Consider the following pairs of examples:

- (1) a. Someone is available.
b. There is someone available.
- (2) a. Reesa is available.
b. *There is Reesa available.

Given our discussion of *there*-existentials in class on Thursday (the 4th), propose an explanation in clear, concise prose of why (2b) is ungrammatical.

(ii) Does (3a) presuppose (3b)? Justify your answer with the relevant test examples.

- (3) a. Reesa is available.
b. There is someone named Reesa.