

Quiz 1 Review

You should be familiar with . . .

1. Sets:

- (a) How to specify a set
 - i. by listing its members.
 - ii. by using the predicate notation.
 - iii. by using recursive rules.
- (b) Identity: when are two sets the same? Two sets are the same when they have the same members. (There is only one empty set: do you remember why?)
- (c) Membership and subsethood. How can you tell whether a set is a member or a subset of another? When is a set $a(n)$ (improper/proper) subset of another?
- (d) Singletons: watch out for the difference between $\{a\}$ and $\{\{a\}\}$ (and the difference between $a \in \{a\}$ and $a \in \{\{a\}\}$: the first is true, the second is not.)
- (e) *The empty set*. Remember that, given the way the subset-of relation is defined, the empty set is (trivially) a subset of every set. That means that for any set A , $\emptyset \subseteq A$ is always true.
- (f) Cardinality of a set.
- (g) Power sets. (It is handy to know how to calculate the cardinality of the power set of any set.)

2. Operations on sets.

- (a) Union
- (b) Intersection
- (c) Difference
- (d) Complement
- (e) Venn diagrams

It is important to understand the properties of these operations, as given by the set-theoretic equalities of the book, but you don't have to memorize the equalities.

3. Ordered pairs. Remember that they are just a special kind of set! $\langle a, b \rangle = \{\{a\}, \{a, b\}\}$

4. Relations

- (a) Cartesian Product
- (b) Domain
- (c) Range
- (d) Complement
- (e) Diagrams

5. Properties of Relations.

- (a) Reflexivity
- (b) Symmetry
- (c) Transitivity

It is important to understand the definitions and see the differences between them. You should be able to tell whether a given relation is, say, irreflexive or non-reflexive, once you are given the definition for those terms. Don't feel bad if you understand the properties but get usually confused about the names!

Remember that in order to determine the properties of a given relation, it is always important to know which set the relation is defined on ('is a sister of' is symmetric when defined on the set of females, but what happens when defined in the set of all human beings?.)

Tip: Always watch out for pairs of the type $\langle \alpha, \alpha \rangle$ when determining whether a property is transitive or not.

6. Equivalence Relations and Partitions

7. Orderings

8. Functions

- (a) When is a relation a function?
- (b) Domain of a function
- (c) Range of a function
- (d) Inverses
- (e) Complements

9. Infinity:

- (a) Cardinality of a set. "same cardinality as".
- (b) Finite vs. infinite. How to show that a set is infinite.
- (c) Denumerably infinite vs. non-denumerably infinite. How to show.
- (d) Unbounded vs. infinite.

You don't need to worry about. . .

1. You *should* be familiar with the set theoretic equalities, but don't need to memorize them. It is important to know how to *use* them. (If I ask you to use them to show something, I'll give you a handout that lists them.)
2. Russell's paradox. *Heterological* and *autological* adjectives.
3. Partial functions.
4. Function composition.
5. Dense orderings.
6. Well orderings.