

Homework 4

Question 1. Sets

From Partee et al., page 23, exercise 2.

For any arbitrary set S ,

- (a) is S a member of $\{S\}$?
- (b) is $\{S\}$ a member of $\{S\}$?
- (c) is $\{S\}$ a subset of $\{S\}$?
- (d) what is the set whose only member is $\{S\}$?

Question 2. Relations and Functions

Based on Partee et al., pages 36-37, exercises 1 and 2.

Let $A = \{a,b,c\}$ and $B = \{1,2\}$.

- (a) Which of these relations are functions from A to B ?
 - i. $R1 = \{\langle a,1 \rangle, \langle a,2 \rangle\}$
 - ii. $R2 = \{\langle a,1 \rangle, \langle b,1 \rangle\}$
 - iii. $R3 = \{\langle a,1 \rangle, \langle b,2 \rangle, \langle c,1 \rangle\}$
 - iv. $R4 = \{\langle a,2 \rangle, \langle b,2 \rangle, \langle b,1 \rangle\}$
 - v. $R5 = \{\langle a,2 \rangle, \langle c,1 \rangle\}$
 - vi. $R6 = \{\langle b,1 \rangle, \langle c,2 \rangle\}$
- (b) Specify domain and range for $R1$.
- (c) Specify the complementary relation $R1'$ and the inverse R^{-1} .
- (d) Is $(R')^{-1}$ (the inverse of the complement) equal to $(R^{-1})'$ (the complement of the inverse)?
- (e) Which, if any, of the functions are onto?
- (f) Which, if any, of the functions are one-to-one?
- (g) Do any of the functions have inverses that are also functions?

Question 3. Sense vs Reference

For each of the following pairs of sentences,

- i. tell whether they have the same truth conditions or different truth conditions
 - ii. justify your answer by talking about possible worlds and sense/reference of sentence-parts
- (a) The first Roman Emperor had blue eyes.
Gaius Julius Caesar Octavianus had eyes that were blue.
 - (b) California coast looks out on the Pacific ocean.
California coast looks out on the largest ocean on Earth.
 - (c) The busiest staff member wrote the article.
The article was written by the busiest staff member.
 - (d) If you wash your sheets with bleach, the stains will come out.
Clorox gets the stains out of sheets.