1 Set membership and subsets (Partee et al. 1990:24)

$$\begin{array}{lll} S_1 & = & \{\{\varnothing\},\{A\},A\} \\ S_2 & = & A \\ S_3 & = & \{A\} \\ S_4 & = & \{\{A\}\} \\ S_5 & = & \{\{A\},A\} \end{array} \qquad \begin{array}{lll} S_6 & = & \varnothing \\ S_7 & = & \{\varnothing\} \\ S_8 & = & \{\{\varnothing\}\} \\ S_9 & = & \{\varnothing,\{\varnothing\}\} \end{array}$$

Of these nine sets,

i) which are subsets of S_1?

ii) which are members of S_9?

iii) which are subsets of S_9?

iv) which are members of S_4?

v) which are subsets of S_4?

(Example: “which are members of S_1?” —S_2, S_3 and S_7)

2 Operations on sets (Partee et al. 1990:25)

Let $A = \{a, b, c\}, B = \{c, d\}, C = \{d, e, f\}$. What are the following sets?

i) $A \cup B$

ii) $A \cap B$

iii) $A \cup (B \cap C)$

iv) $C \cup A$

v) $B \cup \varnothing$

vi) $A \cap (B \cap C)$

3 Optional problem: The cardinality of the power set

For any set A, we have $|\wp(A)| = 2^{|A|}$. Prove this ($\approx$ explain in rigorous terms why this holds).