Exercises for Lecture 4

1 Sets 1

Let A = {1,-2}, B = {1,-1,2} and C = {1,{2,3}}.

1. What is the the power-set of B? And the power-set of C?
2. Which of the following statements is true? **Argue why!**
   (a) $\{1\} \not\subseteq A$
   (b) $1 \in C$
   (c) $\{1\} \in A$
   (d) $2 \in C$
   (e) $1 \subseteq A$
   (f) $3 \in C$
   (g) $1 \in A$
   (h) $\{1\} \in C$
   (i) $A \subseteq B$
   (j) $\{2, 3\} \in C$
   (k) $B \subseteq A$
   (l) $\{2\} \in C$

2 Sets 2

Let A = {1,0,1} and B = {1,2}. Write explicitly the sets $A \times B$, $A \times A$, $(A \times A) \cap (A \times B)$, $A \times (A \cap B)$, $(A \times A) \cup (A \times B)$, $\mathcal{P}(B \times B)$ and $\mathcal{P}(B) \times \mathcal{P}(B)$.

3 Relations

In year 2052, management has decided to award an iPhone 50G-Teleport to the best teacher and the best student at ITU. In order to choose the winners, all students must vote for two teachers and all teachers must express a single vote for their favourite student. Given the set P of people at ITU (consisting

of both students and teachers), the relation $V \subseteq P \times P$ expresses whether some person $p1$ has voted for some other person $p2$. Moreover, the relation M relates two persons whenever they have voted for each other. Discuss the properties (reflexive, symmetric, antisymmetric, transitive) of relations V and M.