SI Session 2: Basic Set Theory and More Proof Writing

1 Set Theory

1.1 Basic Grammar

Define: $A = \{1, 2, 3, \{3, 2\}, 2, 4\}; B = \{1, 2, 3\}; C = \{A, \{B\}, C\}$

1. True or false: $A \in B$
2. True or false: $B \in A$
3. True or false: $B \subseteq A$
4. True or false: $\{A\} \in C$
5. True or false: $\{B\} \in C$
6. True or false: $\emptyset \in C$
7. True or false: $\emptyset \subset C$
8. Something here does not make sense, find it.

1.2 Carteisan Product

Define: $K = \{red, blue, green\}; L = \{1, 2, 3\}$

9. Calculate: $K \times L$
10. Calculate: $L \times K$
11. Calculate:$|K|, |L|, |L \times K|$

2 Proof-Writing

Prove by induction:
$a_1b_1+...+a_nb_n = (a_1-a_2)b_1+(a_2-a_3)(b_1+b_2)+...+(a_{n-1}-a_n)(b_1+...+b_{n-1})+a_n(b_1+...+b_n)$