Universidad de los Andes
MATE-2201

Analysis 1

Problem Sheet 1

Sets; maps.

Hand in: 27 January 2009

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1. Exactly one of the following statements is true:

(A) More than ten students attend the class.

(B) Less than ten students attend the class.

(C) At least one student attends the class.

How many students attend the class?

2. (a) Find the power sets of
(i) $L = \emptyset$, (ii) $M = \{0\}$, (iii) $N = \{1, 2, 3\}$.

(b) Let $N = \{1, 2, 3\}$ and consider the relation $\subseteq$ on $\mathbb{P}N$. Is $\subseteq$ reflexive, transitive, symmetric? Does $\subseteq$ define a total order on $\mathbb{P}N$?

3. (a) For sets A, B and C show:

- $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$,
- $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.

(b) For sets $A, B \subset X$ show:

- $X \setminus (A \cup B) = (X \setminus A) \cap (X \setminus B)$,
- $X \setminus (A \cap B) = (X \setminus A) \cup (X \setminus B)$.

4. Let X, Y and Z be sets and $f : X \to Y$, $g : Y \to Z$ functions.

Show:

(a) If g is injective, then

$$f \text{ is injective} \iff g \circ f \text{ injective.}$$

(b) If f is surjective, then

$$g \text{ surjective} \iff g \circ f \text{ surjective.}$$