**Elementary Functions and Calculus I**
**Math 131 (Sec 42), Autumn 2004**
Handout 1

- As was talked about in class, a set is a collection of objects. If a set $A$ contains the objects $a$, $b$ and $c$, we write $A = \{a, b, c\}$. We usually will talk about sets of numbers, e.g. $\mathbf{N} = \{1, 2, 3, 4, \ldots\}$. Can you think of more examples?

- We will write $a \in A$ to mean that $a$ is an element of (or is contained in) $A$. For example $1 \in \mathbf{N}$.

- In our first class we mostly talked about things we will assume (e.g. $x + y = y + x$ for any real numbers $x$ and $y$). These things are called axioms. From the axioms we will derive or prove results. These results are deduced using only the axioms and logic. Provided our axioms are true the results will be too. We often call important results *theorems.*

- Theorems often take the form *If A, then B,* where $A$ and $B$ are statements. For example *If* $x \neq 0$*, then* $x^2 > 0$. We use the notation $A \Rightarrow B$ to mean *If A, then B.* Similarly, we use the notation $A \Leftarrow B$ to mean $A$ *only if* $B$. If $A \Rightarrow B$ and $A \Leftarrow B$ we write $A \Leftrightarrow B$.

- For a statement $A$ we write $\sim A$ to mean the negation of $A$. For example, if $A$ is the statement *Paul has no apples* then $\sim A$ is the statement *Paul has some apples.* We have that (i) $A \Rightarrow B$ is equivalent to the statement (ii) $\sim A \Leftarrow \sim B$. We call (ii) the *contrapositive* of (i).

- Since some phases occur often in mathematics we use some useful abreviations. The symbol $\forall$ means *for all* or *for any.* The symbol $\exists$ means *there exists* and *such that* is written *s.t.*. For example *there exists areal number x such that* $5x = 1$ is written $\exists x \in \mathbf{R}$ *s.t.* $5x = 1$.

- If you are confused about anything on this sheet it may help to read through *A bit of logic* on page 3 of the text and *Quantifiers* on page 4. If this doesn't help please ask your tutor or the lecturer.