SOME USEFUL NOTATION
MATH 1110 (FALL 2009)

NOTATION	EXPLANATION	EXAMPLE
$\{a, b, c, \ldots\}$	The is the way to write the **set** containing the elements a, b, c, etc.	$\{1, 2\}$ is the set whose elements are the numbers 1 and 2.
$\in$	Read this symbol as "**is an element of**".	"$a \in A$" means that a is an element of the set A. "$a, b \in A$" means that both a and b are elements of the set A. In the above example, $1, 2 \in \{1, 2\}$.
$\subset$ or $\subseteq$	These are symbols for **subset**. You can use either. If A and B are sets then $A \subset B$ if all of the elements of A are also elements of B.	If $A = \{1, 5\}$ and $B = \{1, 5, 16\}$, then $A \subset B$.
$\cup$	This is the symbol for **union**. If A and B are sets then $A \cup B$ is the set that consists of all of the elements in A and all of the elements in B.	If $A = \{1, 2\}$ and $B = \{2, 3, 4\}$, then $A \cup B = \{1, 2, 3, 4\}$.
$\cap$	This is the symbol for **intersection**. If A and B are sets then $A \cap B$ is the set that consists of all of the elements that are in both of A and B.	If $A = \{1, 2\}$ and $B = \{2, 3, 4\}$, then $A \cap B = \{2\}$.
$-$ or $\setminus$	These are symbols for **set minus**. If A and B are sets then $B - A$ (or $B \setminus A$) is the set which consists of the elements of B which are NOT elements of A.	If $A = \{1, 2\}$ and $B = \{2, 3, 4\}$, then $B - A = \{3, 4\}$.
$\{x \in A \mid P(x)\}$	This is the set consisting of all elements $x \in A$ such that statement $P(x)$ is true. (Sometimes the symbols ":" or "s.t." are used in place of "|".)	$\{x \in \mathbb{R} \mid x > 3\}$ is the set of real numbers that are larger than 3.

Symbol	Explanation	Example
$\mathbf{Z}$, $\mathbb{Z}$	This is the set of **integers**, i.e. $\mathbb{Z} = \{\ldots, -2, -1, 0, 1, 2, \ldots\}$.	$-63, 24, 100000 \in \mathbb{Z}$.
$\mathbf{Q}$, $\mathbb{Q}$	This is the set of **rational numbers**, i.e. fractions of integers.	If $a, b \in \mathbb{Z}$ and $b \neq 0$, then $\frac{a}{b} \in \mathbb{Q}$.
$\mathbf{R}$, $\mathbb{R}$	This is the set of **real numbers**, i.e. positions on the real number line.	$3, -1, \frac{1}{2}, \sqrt{2}, \pi \in \mathbb{R}$.
(a, b)	This is the **open interval** from a to b, (assuming $a \leq b$).	$(-2, 6) = \{x \in \mathbb{R} \mid -2 < x < 6\}$.
$[a, b]$	This is the **closed interval** from a to b, (assuming $a \leq b$).	$[-2, 6] = \{x \in \mathbb{R} \mid -2 \leq x \leq 6\}$.
$[a, b)$ or $(a, b]$	These are **half-open interval** from a to b, (assuming $a \leq b$).	$[-2, 6) = \{x \in \mathbb{R} \mid -2 \leq x < 6\}$ and $(-2, 6] = \{x \in \mathbb{R} \mid -2 < x \geq 6\}$.
$D \xrightarrow{f} Y$ or $f\colon D \to Y$	This reads "f is a **function** from the set D to the set Y".	If $f(x) = 1/x$, then $(\mathbb{R} - \{0\}) \xrightarrow{f} \mathbb{R}$. (If no domain is specified, we will always assume that the domain is as large as possible.)
$D(f)$	This is the **domain** of the function f, i.e. the set of inputs of f.	If $A \xrightarrow{f} B$, then $D(f) = A$.
$R(f)$	This is the **range** of the function f, i.e. the set of outputs of f. If $D(f) = A$, then $R(f) = f(A) = \{f(x) \mid x \in A\}$.	If $f(x) = \sqrt{x}$, then $D(f) = R(f) = [0, \infty)$.