# Set Theory, Second Quiz
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### December 10, 1996

**1.** Let $x$ and $a$ be two sets. Recall that $\cap x$ means the intersection of all sets which are in $x$, i.e. $\cap x = \{z: z \in y \text{ for all } y \in x\}$.

**1a.** Prove that "the object" $b := \{y \cap a: y \in x\}$ is a set.

**1b.** Show that $a \cap (\cap x) = \cap b$.

**2.** Let $x$ be a set. Show that the elements of $x$ with exactly two elements form a set.

**3. Cartesian Product of Two Sets.** Let $x$ and $y$ be two sets. Show that "the object" $\{\{\{a\},\{a,b\}\}: a \in x,\ b \in y\}$ is a set[1].

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[1] This set is called the Cartesian product of $x$ and $y$ and is denoted by $x \times y$.