Scavenger Hunt 2005 **May 5, 2005**

Item 200

Team: Armadillo of Darkness

Lemma 1.1 $\exists x, x' \in \{milkshakes\} s.t. x \neq x'$

proof: {chocolate milkshakes}$\subseteq$ {milkshakes}, $\wedge$ {strawberry milkshakes}$\subseteq$ {milkshakes}. But we also know that {chocolate milkshakes}$\bigcap${strawberry milkshakes}$=\phi$, and that {strawberry milkshakes}, {chocolate milkshakes} $\neq \phi$. So, by the Axiom of Choice, we can choose $x \in${chocolate milkshakes}, and $x' \in${strawberry milkshakes}, and $x \neq x'$.

□

Lemma 1.2 *La-la la-la la.*

proof: I'd prove it'ya but I have to charge.

□

Definition 1.3 *Define $yard_\delta(m)$ to be $\{x||x-m|<\delta\}$, where $m \in \{milkshakes\}$, $\delta \in \mathbb{R}, \delta > 0$.*

Lemma 1.4 *Your milkshake is not in my yard.*

proof: Since our space is Hausdorff, we can choose δ so that for $m \neq m', yard_\delta(m) \bigcap yard_\delta(m') = \phi$. So (my yard)$\bigcap$(your yard)$=\phi$ $\forall$ you. Moreover, your milkshake $\in yard_\delta(yourmilkshake)$. Therefore your milkshake is not in my yard.

□

Definition 1.5 *We define a partial ordering on the set {milkshakes} in the following way: if $x, x' \in \{milkshakes\}$, then $x \geq x'$ if x brings at least as many boys to the yard as x'. We say a milkshake x is <u>better</u> than a milkshake x' if x brings more boys to the yard than x'.*

Lemma 1.6 *If $\exists x : x \in \{milkshakes\} \wedge y \in \{boys\}, \lim_{x\to y}(x-y) = 0 \Rightarrow |x-\epsilon| < |my\, yard|$, then for every yard y, if $\exists$ a boy $b \in y$, then y is my yard.*

proof: $\forall x \in \{milkshakes\}, \forall y \in \{boys\}, \lim_{x \to y}(x - y) = 0$, so by the hypothesis, $|x - \epsilon| < |my\, yard|, \forall \epsilon > 0, \epsilon \in \mathbb{R}$

$$\Rightarrow |y| - \epsilon \leq |y - \epsilon| < |my\, yard|,\ by\, the\, reverse\, triangle\, inequality$$

$$\Rightarrow |y| < |my\, yard| + \epsilon \Rightarrow y\, is\, within\, \epsilon\, of\, my\, yard$$

Therefore y $\in \overline{myyard}$, the closure of my yard. But since all other yards are open sets not intersecting my yard (by lemma 1.5), this proves y is not in any other yard, $\forall y \in \{boys\}$.

□

Theorem 1.7 *If* $\exists x : x \in \{milkshakes\} \wedge y \in \{boys\}, \lim_{x \to y}(x - y) = 0 \Rightarrow |x - \epsilon| < |my\, yard|$*, then my milkshake is better than yours.*

proof: By lemma 1.6, and definition 1.5, it suffices to show that there is a boy in my yard. There is milkshake in my yard (by definition 1.3), moreover milkshake ⇒ booty. But, by extensive experimental research on item ♯162[1], it has been determined that boys go to booty. But, by lemma 1.6, boys don't go to your yard, $\forall you \neq me \Rightarrow$ boys don't go to your booty $\forall you \neq me$. Therefore boys go to my booty. But my booty is in the interior of my yard. Therefore there are boys in my yard.

□

Footnotes

1. **item ♯162:** http://www.theassbook.com/