1173-05-295 **Joseph Briggs*** (jgb0059@auburn.edu), 334 Parker Hall, Auburn University, AL 36849. *Double Dual KKM Theorem.* Preliminary report.

The KKM Theorem is a beloved continuous version of Sperner's Lemma. A *KKM cover* of the n-dimensional simplex Δ_n on the vertex set $\{1, 2, \ldots, n+1\}$ is a family of closed sets $\{A_i : i \leq n+1\}$ with the property that

$$\bigcup_{i \in \sigma} A_i \supset \sigma$$

for every face σ of Δ_n, and the KKM Theorem states that $\bigcap A_i \neq \emptyset$ for such a cover. Its dual version gives nonempty intersection if instead each A_i contains a different facet.

We will describe an explicit face-reversing homotopy from the simplex to its dual, and use it to show the original KKM and dual KKM theorems are equivalent. This in turn shows that cutting multiple cakes and allocating rooms in multiple houses are equally difficult problems. (Received September 21, 2021)