

1116-05-2180

Beattie A Kuture* (bak02013@pomona.edu), **Oscar F Leong** and **Christopher A Loa**.

Using volume to prove Tucker's Lemma in 2-dimensions.

Sperner's Lemma is a combinatorial result that can be used to prove Brouwer's fixed point theorem and has many useful applications in economics. Recently, McLennan and Tourky provided a novel proof of Sperner's Lemma using a volume argument and a linear deformation of a triangulation. We adapt a similar argument to prove Tucker's Lemma on a triangulated 2-dimensional cross-polytope with the condition that its extreme points have distinct labels. However, the technique used in McLennan-Tourky's argument does not directly apply because such deformation would distort the volume of the cross-polytope. So, we remedy this by inscribing the cross-polytope in its dual polytope, triangulating it, and considering how the volumes of the deformed simplices behave. We then generalize the argument to apply to triangulated cross-polytopes whose vertices do not have distinct labels. (Received September 22, 2015)