1106-05-454 **Alex Strang*** (alex.g.strang@gmail.com), Department of Mathematics, Applied Mathematic, Case Western Reserve University, Cleveland, OH 44106, and **Oliver Haynes**, Golisano College of Computer and Information, Rochester Institute of Technology, Rochester, NY 14623. *Density Determined Graphs and Analyzing Cognitive Changesin the Brains of Athletes.*

Graph theoretic measures have emerged as valuable tools for analyzing social and biological networks. The distance between two nodes is defined to be number of edges in a shortest path between them. If there is no path between the two vertices, the distance is defined to be infinite. The average distance over all pairs of vertices is known as the characteristic path length. The average of the reciprocals of the distances is known as the global efficiency. In addition there are two local properties, clustering coefficients and local efficiency. While these four properties have been carefully studied, little has been determined as to how the two global properties relate to one another and how the two local properties relate to one another. We show that in both cases or most graphs we approach a linear relationship.

We then apply these findings in a real world setting involving the analysis of resting state functional MRI scans of football players at the University of Rochester. Our goal is to identify trends in the data that indicate decreased cognition in athletes resulting from repeated sub-concussive hits to the brain. (Received August 28, 2014)