MATEMATISKA INSTITUTIONEN
STOCKHOLMS UNIVERSITET
Avd. Matematik

SJÄLVSTÄNDIGT ARBETE I MATEMATIK

Torsdagen den 20 oktober kl. 11:00-12:00 presenterar Markus Sandell sitt arbete "Borsuk's Conjecture and Erdos Distance Problem - From a Graph Theoretical Point of View" (15 högskolepoäng, grundnivå).

Handledare: Paul Vaderlind

Plats: Sal 32, hus 5, Kräftriket

Sammanfattning: This paper concerns two conjectures that was stated in the 30's and 40's and was not solved for about 60 years. The first one is the conjecture stated by Karol Borsuk in 1933 which says that any bounded subset in $\mathbb{R}^n$ can be divided into $n+1$ subsets of smaller diameter. This was by many mathematicians considered true until 1993, when Kahn and Kalai [18] came up with a counterexample in the 1325th dimension. In 2013 Andriy Bondarenko came up with a counterexample in the 65th dimension using the theory of strongly regular graphs. We will explain the disproof by Bondarenko in this paper.

The second conjecture was given in 1946 when Paul Erdos said the following: if you have n points in the plane, then these points determine at least $cn/\log n$ distinct distances, for some constant c. Erdos himself proved that the number of distances is at least more than $c\sqrt{n}$, which we will also show in this paper together with greater lower bounds by Moser [20] and Székely [24].

This paper is divided into three sections. The first one introduces some basic theory that will be needed for the rest of the paper, while the second and the third one is about Borsuk's conjecture and Erdos distance problem. At the end of the last section we mention even greater lower bounds and how Erdos conjecture finally was proved by Katz and Guth in 2010 [14].

Alla intresserade är välkomna!