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Grid Representations and the Chromatic Number

Martin Balko

(Submitted on 1 Apr 2012)

A grid drawing of a graph maps vertices to grid points and edges to line segments that avoid grid points representing other vertices. We show that there is a number of grid points that some line segment of an arbitrary grid drawing must intersect. This number is closely connected to the chromatic number. Second, we study how many columns we need to draw a graph in the grid, introducing some new NP-complete problems. Finally, we show that any planar graph has a planar grid drawing where every line segment contains exactly two grid points. This result proves conjectures asked by David Flores-Pe\~naloza and Francisco Javier Zaragoza Martinez.

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