

# Extremal finite subgraphs of the grid graph

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## Abstract

For each  $n \in \mathbb{N}$  we discuss and determine the maximum number of edges an induced subgraph of the grid graph  $\mathbb{Z}^d$  on  $n$  vertices can have. This involves work of Bollobás, Leader and Thomasson to name a few. Inspired by questions and emails from an undergraduate student in computational biology at Brown University some years ago, I worked on this problem using elementary methods, not knowing that it had, essentially, been solved some twenty years earlier by Bollobás and Leader, who approach this from a more geometrical point of view. I will discuss both my way and their way and what I personally learned from this. – There seems to be some sort of “Heisenberg’s uncertainty principle” going on here between the elementariness of arguments and their shortness/simplicity.

**Keywords:** grid graph, induced subgraph, extremal problems.