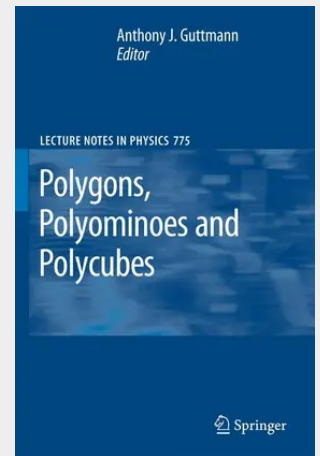


Polygons, Polyominoes and Polycubes

The problem of counting the number of self-avoiding polygons on a square grid, -therbytheirperimeterortheirenclosedarea,is aproblemthat is soeasytostate that, at ?rst sight, it seems surprising that it hasn't been solved. It is however perhaps the simplest member of a large class of such problems that have resisted all attempts at their exact solution. These are all problems that are easy to state and look as if they should be solvable. They include percolation, in its various forms, the Ising model of ferromagnetism, polyomino enumeration, Potts models and many others. These models are of intrinsic interest to mathematicians and mathematical physicists, but can also be applied to many other areas, including economics, the social sciences, the biological sciences and even to traf?c models. It is the widespread applicab- ity of these models to interesting phenomena that makes them so deserving of our attention. Here however we restrict our attention to the mathematical aspects. Here we are concerned with collecting together most of what is known about polygons, and the closely related problems of polyominoes. We describe what is known, taking care to distinguish between what has been proved, and what is c- tainlytrue,but has notbeenproved. Theearlierchaptersfocusonwhat is knownand on why the problems have not been solved, culminating in a proof of unsolvability, in a certain sense. The next chapters describe a range of numerical and theoretical methods and tools for extracting as much information about the problem as possible, in some cases permittingexactconjecturesto be made.

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