TOPOGRAPHS OF VARIOUS KINDS AND THEIR PERIODICITY

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Abstract. A topograph is a 3-regular tree in the plane with labels satisfying a given rule. J.H. Conway introduced them in his elegant graphical depiction of quadratic forms. We'll review these as well as other examples, reversing the usual order by starting with a topograph rule and seeing how the theory develops. If a topograph looks the same locally in two different places then it must be periodic. Folding up periodic topographs associated to the general Markov equation $x^2 + y^2 + z^2 - xyz = D$, gives an explicit visual classification of its integer solutions. This completes a recent result of Ghosh and Sarnak. Very little background will be required.