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Combinatorial problems from and for Horn formulas. Preliminary report.

We consider some combinatorial problems related to propositional Horn formulas. We give an algorithmic version of the Kovari-Sos-Turan argument for the existence of large balanced complete bipartite graphs in dense graphs. This leads to algorithmic versions of previous results on the decomposition of arbitrary graphs and bipartite graphs into complete bipartite graphs, where the complexity of a decomposition is measured by the sum of the number of vertices. This, in turn, is used in an approximate Horn minimization algorithm. We also consider some extremal and phase transition problems for directed hypergraphs corresponding to Horn formulas. (Received January 30, 2009)