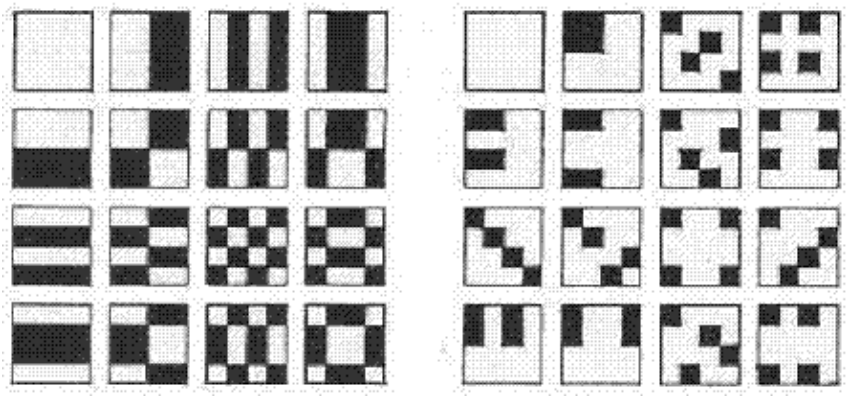
Steven H. Cullinane **Inscapes**. Query. June 12, 1982.

Definition: Let R be an n−ary symmetric relation on a set of t subsets of a t−set, where $n < t = uv$, for positive integers n, t, u, v.

Represent each of the t subsets by the 1's in a uxv array a_i over GF(2), where $1 \leq i \leq t$. An *inscape* of R is a uxv array A of the a_i such that R is true for n of the a_i (that is, for the subsets represented by these a_i) if and only if the arrangement of the a_i within A is the same as the arrangement of the 1's in some nonempty a_i.

Examples: (Light and dark represent 0's and 1's.)



Remarks: Inscapes are useful for visualizing relations in certain finite geometries. The above examples, for instance, illustrate relations among the 15 hyperplanes of PG(3,2) and among the 15 lines fixed under a particular symplectic polarity of PG(3,2).

Query: What is known about combinatorial systems of this sort?

Note: For some other properties of the a_i in the second example, see E. F. Assmus, Jr., and J. E. Novillo Sardi, "Generalized Steiner systems of type 3−(v, {4,6}, 1)," *Finite Geometries and Designs*, London Math. Soc. Lecture Note Series 49 (Cambridge Univ. Press, 1981), pp. 16−21.