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Flag f-Vectors of Colored Complexes

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One can construct an abstract simplicial complex on a set of colored vertices with the restriction that no two vertices of the same color can be in the same face. The flag f-numbers of the complex are the numbers of faces whose vertices are precisely a given color set, e.g., edges with exactly one red vertex and one blue vertex. It then makes sense to ask what possible collections of flag f-numbers a complex could have. More than twenty years ago, it was shown that three other characterization problems are equivalent to this one, but none of the problems has a known solution. I will explain why there cannot be a “nice” solution to this problem of a certain sort analogous to that of some similar problems, and then give a solution to the case of three colors.
