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Hereditary properties and forbidden orientations

Several graph properties are characterized as the class of graphs that admit an orientation avoiding finitely many oriented structures. For instance, if F_k is the set of homomorphic images of the directed path on $k + 1$ -vertices, then a graph is k -colourable if and only if it admits an orientation with no induced oriented graph in F_k . There are two basic problems regarding this kind of characterizations: 1) given a finite set of oriented graphs, F , characterize the class of graphs that admit an F -free orientation, and 2) given a graph property, \mathcal{P} , determine if there a finite set of oriented graphs F such that a graph belongs to \mathcal{P} if and only if it admits an F -free orientation. We begin by addressing the first problem when F is a set of oriented graphs on three vertices, and we conclude by exhibiting necessary conditions upon certain graph properties to admit such characterization.