

Matroid theory: exercise sheet 4

1. Find as many matroids on a two-element set as you can. For each such matroid N , find a simple characterisation of the matroids with no N -minor. [1 point for each such matroid N , up to duality]
2. Let M be a connected matroid on E with $|E| \geq 2$ and let $e \in E$. Prove that at least one of $M/\{e\}$ and $M \setminus \{e\}$ is connected.
- 3.* Let M be a matroid on E and B a basis of M . Let G be the bipartite graph on B and $E - B$ with an edge from $e \in B$ to $f \in E - B$ when $e \in C_f^B$. Prove that M is connected as a matroid if and only if G is connected as a graph.