

Matroids And their Graphs

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Definition 0.1. If M is a matroid, then there exists a bijection from the ground set of M_i to the ground set of M_j , such that a set is independent in the first matroid if and only if it is independent in the second matroid, then M_i and M_j are said to be isomorphic

Exercise: 2.4

Let E be a set, $\{1, 2, 3\}$ then

i) Show there are exactly eight non-isomorphic matroids on E . Along with the corresponding Graph of each matroid

Solution:

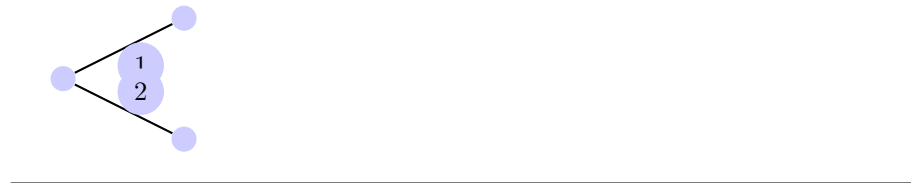
$\{\emptyset\}$



$\{\{\emptyset\}, \{1\}\} \cong \{\{\emptyset\}, \{2\}\} \cong \{\{\emptyset\}, \{3\}\}$



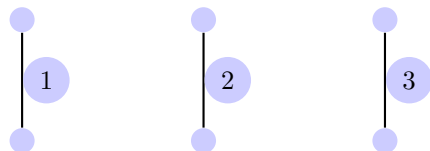
$\{\{\emptyset\}, \{1\}, \{2\}, \{1, 2\}\} \cong \{\{\emptyset\}, \{1\}, \{3\}, \{1, 3\}\} \cong \{\{\emptyset\}, \{2\}, \{3\}, \{2, 3\}\}$



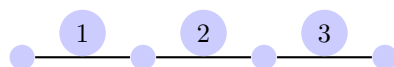
$\{\{\emptyset\}, \{1\}, \{2\}\}$



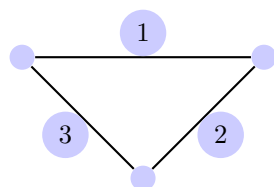
$$\{\{\emptyset\}, \{1\}, \{2\}, \{3\}\}$$



$$\{\{\emptyset\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{2, 3\}\}$$



$$\{\{\emptyset\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}\}$$



$$\{\{\emptyset\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$$

