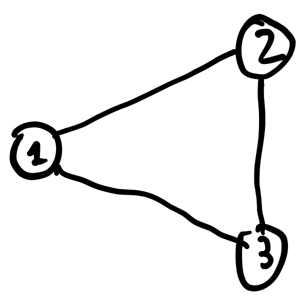
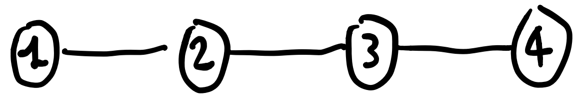
- THE WEDDING PLAN!
  - The problem consists in finding a list of invitees that has maximal length among all those which satisfy the incompatibility constraints
  - This problem can actually be seen as a problem on graphs, this way abstracting away the unnecessary details which are not relevant in solving the problem
  - An UNDIRECTED GRAPH is a pair $G=(V,E)$ where V is a finite set of vertices which can be taken WLOG as $\{1,\dots,n\}$ for a given $n\in\mathbb{N}$ and $E\subseteq\{\{\ell,m\}\mid \ell,m\in V,\ \ell\neq m\}$
  - EXAMPLES

$$G_1=(\{1,2,3\},\{\{1,3\},\{2,3\},\{1,2\}\})$$



$$G_2=(\{1,2,3,4\},\{\{1,2\},\{2,3\},\{3,4\}\})$$



- In a graph $G = (V, E)$, if $v \in V$, then we write $N(v)$ for the subset of V defined as follows:

$$N(v) = \{ w \mid \{v, w\} \in E \}$$

- The wedding plan problem can thus be spelled out as follows: given a graph $G = (V, E)$, determine a subset W of V such that
  1. for all $v \in W$ $N(v) \cap W = \emptyset$
  2. $|W|$ is maximum among the cardinality of all sets having property (1).

- The function we want to compute is

$$f : \text{GRAPHS} \longrightarrow \text{FINITE-SETS}$$

- CODING GRAPHS
  - a graph (V, E) can be encoded as a string in $\{0, 1, \#\}^*$

as follows

$$S_G = \llcorner n \lrcorner \# \llcorner a_1 \lrcorner \# \llcorner b_1 \lrcorner \# \ldots \# \llcorner a_m \lrcorner \# \llcorner b_m \lrcorner$$

$0 \longrightarrow 00$
$1 \longrightarrow 01$
$\# \longrightarrow 10$

$V = \{1, \ldots, n\}$
$E = \{\{a_1, b_1\}, \ldots, \{a_m, b_m\}\}$

- This way, our problem becomes a function $MIS : \{0,1\}^* \longrightarrow \{0,1\}^*$
- This problem is a VERY WELL-KNOWN PROBLEM in graph theory, called the
  - MAXIMUM INDEPENDENT SET.
- Could we say that $MIS \in FP$?

$MIS \in FEXP$