

# MAXIMUM MATCHING

**Definition:** A **matching** in a graph is a subset of the edges that do not share any endpoints. In other words,  $E_0 \subseteq E$  such that  $\forall (u, v) \in E_0$  and  $\forall (w, x) \in E_0$ , if  $u = w$  then  $v = x$ .

**Decision problem:**

- ▶ Input: Graph  $G = (V, E)$  and integer  $k$
- ▶ Question: Does  $G$  have a matching of size  $k$ ?

**Optimization problem:** Find the size of the largest matching in the input graph  $G$ . This is called the **matching number** of  $G$ .

**Construction problem:** Find the largest matching in the input graph  $G$ .

NOTE: MAXIMUM MATCHING can be solved in polynomial time!