

## Chapter 11

# Minimum Spanning Tree Recitation.

### 11.1 The Spanning Tree Problem.

**Definition 11.1.1.** A spanning tree  $T$  of a graph  $G = (V, E)$  is an edges subset of  $E$  such that  $T$  is a tree (having no cycles), and the graph  $(V, T)$  is connected.

*Problem 11.1.1 (MST).* Let  $G = (V, E)$  be a weight graph with weight function  $w : E \rightarrow \mathbb{R}$ . Let's extend the weight for  $E$ 's subsets by defining for the weight of  $X \subset E$  to be  $w(X) = \sum_{e \in X} w(e)$ . The minimum spanning tree of  $G$  is the spanning tree of  $G$  that has the minimal weight according to  $w$ .

**Definition 11.1.2.** Let  $U \subset V$  we will define the cut associated by  $U$  as the outer edges of  $U$ , namely all the edges  $(u, v) \in E$  such  $u \in U$  and  $v \notin U$ . We use the following  $C = (U, \bar{U})$  to denote the cut. We will say that  $X \subset E$  respects the cut if  $X \cap C = \emptyset$ .