# CS 161 (Stanford, Winter 2025)   Lecture 15

Pre-lecture exercises will not be collected for credit. However, you will get more out of each lecture if you do them, and they will be referenced during lecture. We recommend writing out your answers to pre-lecture exercises before class. Pre-lecture exercises usually should not take you more than 30 minutes.

Pre-Lecture Exercises

Let $G = (V, E)$ be a weighted connected undirected graph. A **minimum spanning tree** (MST) of G is a **tree** $T = (V_T, E_T)$ (that is, an acyclic connected graph) so that $E_T \subseteq E$ (that is, the edges of T are all edges in G), $V_T = V$ (that is, the tree touches all of the vertices in G), and so that $\sum_{e \in E_T} w_e$ is as small as possible, where w_e is the weight on edge e.

For example, an MST has been highlighted in the graph below.
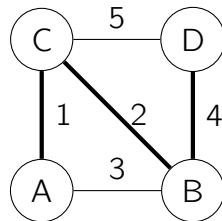
In class we're going to come up with a couple of greedy algorithms to find MSTs. For this pre-lecture exercise, just brainstorm about possible greedy algorithms. What sorts of operations could we do greedily? (Eg, take edges? Take vertices? Take something else? How should we make our greedy choices?) There's no right answer and there are a couple of ways to do it.