# Assignment 35

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## 1

Right out of the box, suppose we have an undirected, weighted graph with 3 vertices:

```
a   b
o---o
 \  |
   o
   c
weight(a, b) = 1
weight(b, c) = 2
weight(a, c) = 3
```

So if we partition the graph such that $G_1$ has the set of vertices $\{b\}$ and $G_2$ has the set of vertices $\{a, c\}$, then we would have to accept $(a, c) \in E$, which is an edge with a weight of 3. There are no self-loops in undirected graphs, so there is no edge $(b, b) \in E$. This leaves us with the bridging edge from $G_1$ to $G_2$. In this case it would be $(a, b) \in E$, which has a weight of 1. This gives us the following MST:

```
a   b
o---o
 \
  o
   c
weight(a, b) = 1
weight(a, c) = 3
```

But the actual MST should be:

```
a   b
o---o
    |
    o
   c
weight(a, b) = 1
weight(b, c) = 2
```

## 2

The cut property relies on the use of all vertices. If you establish the MST for two components they do not necessarily correspond to the MST of the entire tree.

## 3

The recurrence relation is $T(n) = 2T(n/4) + O(n)$. This gives us $O(n)$. Even though the inner loop runs at $O(7n)$, what really matters is that each subproblem is 1/4th the size of its superproblem, that the work is done twice, and that the zip-up time is $O(n)$.