

## Quiz 7

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The Edmonds' algorithm is as follow.

1. Initially, every vertex is considered a tree.
2. For each tree, keep 1 incoming edge with the minimum weight.  $O(E)$
3. If there is no cycle, go to #5.  $O(V)$
4. If there is a cycle, merge trees with the cycle into one and update scores for all incoming edges to this tree, and goto #2.  $O(E)$
5. For each vertex in the tree, add the weight of its outgoing edge to its incoming edges not in the tree. Break all cycles by removing edges that cause multiple parents.  $O(E)$

The worst case complexity of this algorithm is  $O(VE)$ . It is the case that after every step, it form a cycle with 2 vertices. So every time we break the cycle we only eliminate one vertex for not being in cycle. So it take  $V-1$  times to break all the cycle. Every time we break the cycle we have to traverse the graph to find the edge, which means we take  $E$  time to find the minimum edge. So the total algorithm worst case complexity is  $O(VE)$ .