

3. A.)

use an enumerator to find every possible permutation of nodes then test whether it contains all edges
Since we know if there's an enumerator there's a decider we will use an enumerator to find all the different permutations of nodes that we could find.

$N = \text{"on input } \langle G \rangle, \text{ where } G \text{ is a graph.}$

1. for $i \ 1 \dots |V|$
2. simulate enumerator E to find every subset c of i nodes of G .
3. test each subset whether G contains all edges connecting nodes in c .
4. if yes, output c .

Running time: This construction is correct because we will test every possible permutation of nodes and output all of the accepting sets.

step 1: runs for how ever many nodes there are in the graph (will always be finite)

step 2: finds every permutation of i nodes. This is large but still a finite number

step 3. This check if each node is connected to every other node therefore this will be $O(n^2)$

step 4. $O(1)$.

step 3 is based on step 2 and step 2 is based on step 1. However since these are all finite steps based on i they will not grow exponentially.

Therefore the worst case running time is still polynomial $O(n^k)$

Validation:

B.) Since we can pass anything in for k for regular clique, we can pass something in that makes it grow exponentially fast. For example we could pass n in for k . Then it would no longer be polynomial on a deterministic machine. However for clique_k since our user cannot pass in a k , we know that k cannot grow larger than the number of nodes, therefore it will always be finite, making the running time of clique_k polynomial.