CS 254: Computability and Complexity	**Anonymous submission**
Problem Set #08	*November 7, 2019*

3. Let CONNECTED = $\{G|$ G is a connected undirected graph$\}$.

   Step 1 will take O(n) time to scan every nodes and find the starting node since scanning all of them is only dependent on n.

   Step 2 in the worst case will run O(n) times because we would only mark one node at a time.

   Step 3 uses O(n^2) since we need to look at every node and all the nodes adjacent to that node.

   Since step 3 runs O(n) times though, this will make steps 2 and 3 run in O(n) * O(n^2) = O(n^3) time.

   Step 4. will run in O(n) time, as we just scan all the nodes to ensure they are all marked.

   Therefore this algorithm runs in O(n^3 because this is the highest order in all of the steps that we have. Since O(n^3) $\in$ P we know that CONNECTED $\in$ P.