Jordan Allard
CSCI 264-01
Homework 1

HW1 Problem 2 Writeup

1) Pseudocode

```
Let n = the number of computers in the network
Let S = the set of all connections
      // This is the input
Let L = an array of linked lists
      // This is our adjacency list
Let C = an array of size n
      // This will store the number of connections
Let T = an empty array
      // This will store the results
Let v = n
      // The number of computers that still have connections
For every pair (c1, c2) in S:
      Add c2 to L[c1]
      Add c1 to L[c2]
      C[c1], C[c2] += 1
While v > 0:
      Find the index i of the maximum value in C
      C[i] = 0
      v -= 1
      Add i to T
      For every item k in L[i]:
            If i is not in T && C[k] > 0:
                  C[k] -= 1
                  If C[k] <= 0:
                        v -= 1
Return T
```

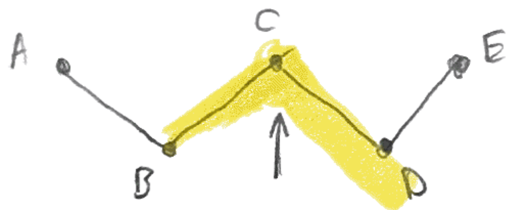
2) Running Time

The estimated running time of this algorithm is O(n^2). At worst, the while loop will run n times, and the for loop inside it will also run n times with the worst input. Thus, with the worst input the algorithm will run n x n times, which is O(n^2).

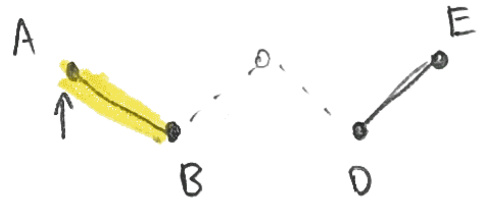
a)

If we can assume the computer makes a bad choice, then it can fail to find the smallest number of computers covering all the cables on the above network.

b)

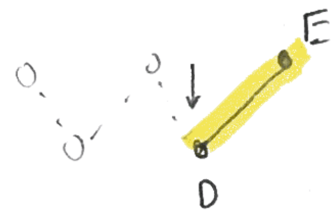


Since B, C, and D all have 2 connections, let's say the algorithm picks C.



Trusted computers: C

All remaining points have 1 connection, so say it picks A.



Trusted Computers: C, A

Final Computers: A, C, D

c) Optimal Solution: B, D