Assignment 4

E)

First, take in how many vertices to read, and name of csv file. Then, we read from the CSV file and move into two separate sections. The first section goes into a 2D matrix and the second goes into a LinkedList. Then we have all the info from the CSV file, so we no longer need it.

Next, we need to find the most and least popular vertices. We compare each row of the LinkedList to some arbitrarily small and large values respectively. Then we can begin to print out some info.

We print out info for the MPV. Included in this are the neighbors of MPV. We do this by traversing through each member of the list, and if the size of that member is the same as the value of maxDegree, it prints out each index of that member.

Then we print out info for LPV, and just as above we traverse through the list, and find the members whose size is the same as the value of minDegree, and print all of those.

Now we write to the two output files.

We write to the adjacency matrix csv file, we place a “X” in the very first diagonal position, and then label each row all the way down. Then each element of our 2D Array is placed into the csv file

Next, we write to the Adjacency list file. Just like above, we add each element of our LinkedList to our new file.

F)

1 + n + n2 + 1 + 1 + n(1 + 2 + 4 + 4) + 1 + 2n + 1 + 2n + n(2 + 1 + n(2 + 1)) + n(2 + 1 + 1 + n(2 + 1)) + 1 + 3n + n(2 + n(3)) + n(2 + 1 + n(3))

1 + n + n2 + 2 + 11n + 2 + 4n + 3n + 3n2 + 3n + 3n2 + 1 + 3n + 2n + 3n2 + 3n + 3n2

13n2 + 30n + 6 is the worst-case cost for this program in terms of n.

Now we will prove Big-Oh

We say that 13n2 + 30n + 6 = O(n2), such that 13n2 + 30n + 6 ≤ c \* n2. Then we can say for certain, that for very large n, we have that c = 14.

G)

Enter number of vertices in file: 256

Enter name of CSV file: C:\Users\Josh\Desktop\GraphEdges\_256x3000.csv

Number of neighbors for MPV: 35

MPV Neighbors:

21,11,16,22,24,38,49,56,60,79,81,83,88,95,98,121,125,128,135,136,143,146,149,155,162,167,177,184,186,192,202,211,215,219,232,253

Number of neighbors for LPV: 12

LPV Neighbors:

29,15,67,68,71,88,116,144,163,173,193,206,240

118,1,18,20,72,82,100,117,132,173,177,232,235

H)

1. Yes, the matrix file is bigger as it must list every relationship to every other vertex. The list file is smaller as only the relevant vertices are listed in relationship to the others. Since all numbers are integers this makes sense.

2. Since the graph is sparse, we can say that Matrix representation consumes more RAM. It uses much more memory in order to represent the same data as a List representation.