

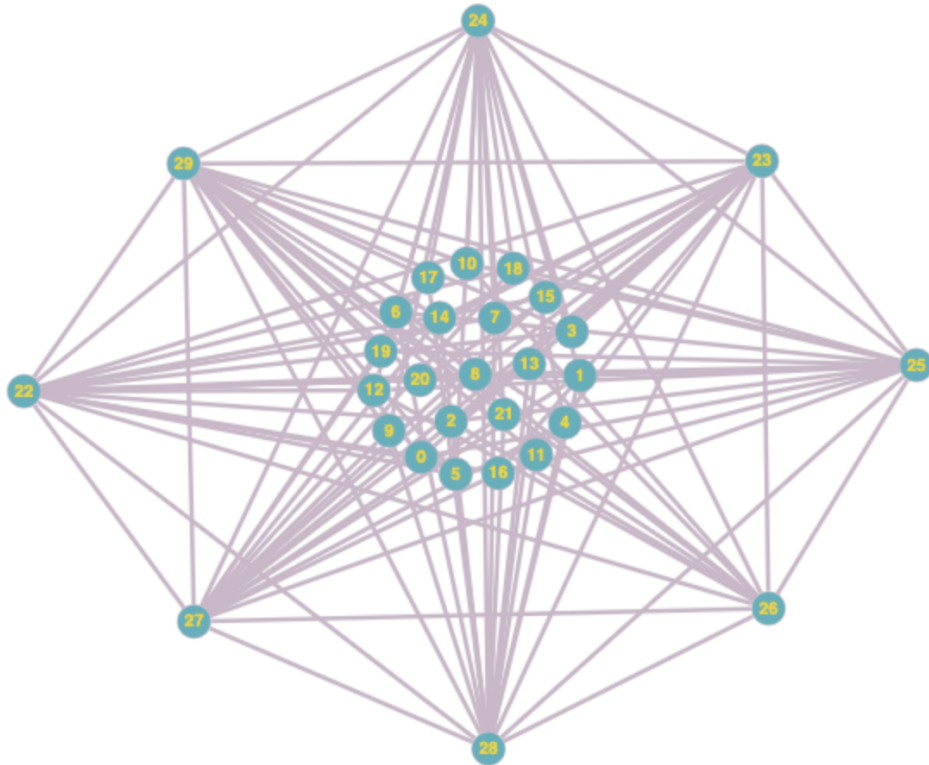
Discrete Mathematics	Section	2
	Student number	21900706
HW7 – Graph	Name	Cho, Youngkwan

- *Instruction*
 - *Set a domain (vertex V and edge E). Ex) cities and highways / students and friendship / etc.*
 - *Build a graph with $|V|$ vertices and $|E|$ edges. $|V| \geq 30$ and $|E| \geq 30$.*
 - *Draw the graph and write the information of the graph in the following sections.*
 - *Then write your own discussion.*
 - *You will earn additional points if your graph (topic) is unique and distinguishable from others*

● General information

Item	Your answer
Graph Title	Light-speed WIFI signals between Starlink satellites and internet users
Vertex (ex. City)	Starlink users and internet satellites
Edge (ex. Highway)	Light-speed WIFI signals
Num. of vertices $= V $	30
Num. of edges $= E $	110
Average degree $= \frac{1}{ V } \sum_{v \in V} \deg(v)$	7.33
Determine if the graph is a connected graph.	Connected

- Draw the graph or put the drawn image of the graph.

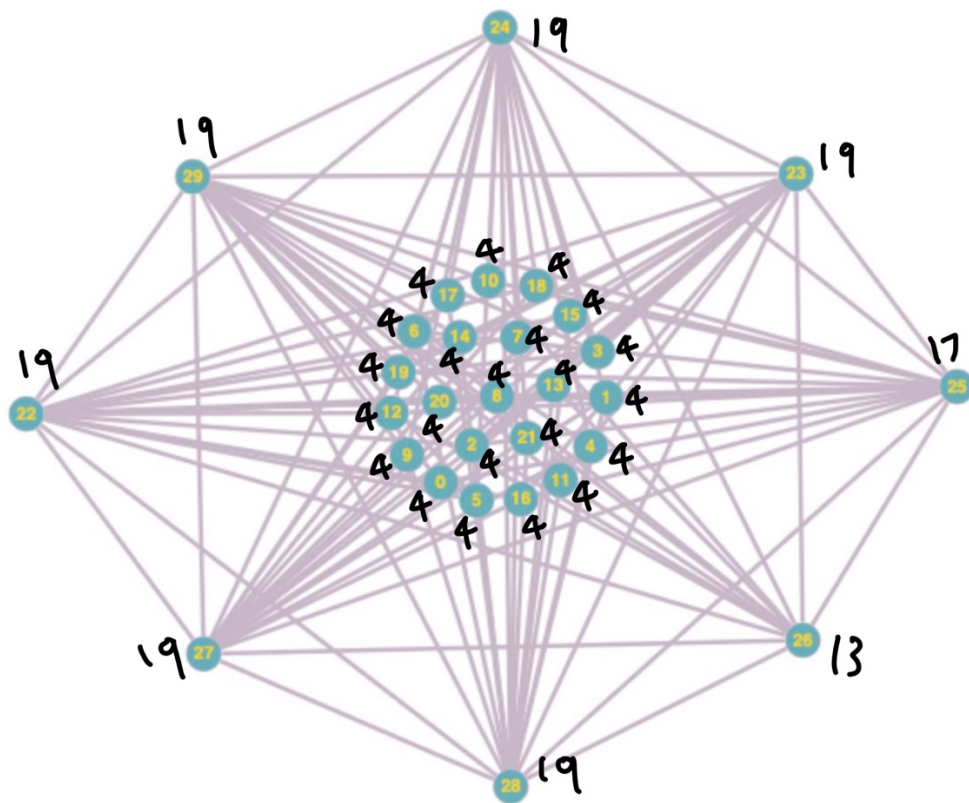


- Write the degree sequence of the graph (in ascending order like 1,2,2,3,4,5,6) and visualize it.

■ Degree sequence

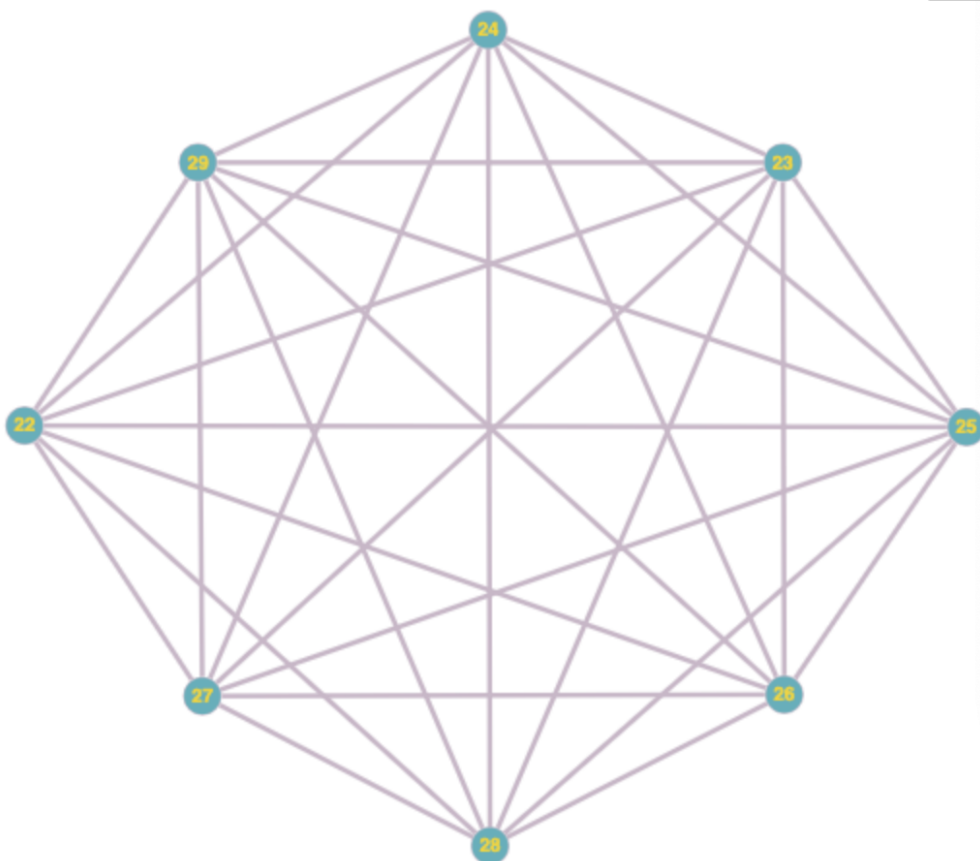
◆ Degree sequence = (4,13,17,19,19,19,19,19,19)

■ Visualization



- Draw a subgraph of vertices with $\deg(v) > \left(\frac{1}{|V|} \sum_{v \in V} \deg(v)\right)$. Thus, vertices with smaller degree should not be included.

$$\deg(v) > \left(\frac{1}{|V|} \sum_{v \in V} \deg(v)\right) = 7.3333$$



- Discussion (put your own discussion regarding the above results)
 - Before talking about my results, Starlink is developing a low latency, broadband internet system to meet the needs of consumers across the globe. It is one of the Satellite internet constellation companies created by Elon Musk.
 - Vertices represent Starlink users and internet satellites, and edges represent light-speed WIFI signals. Vertices from number 0 to 21 are the WIFI users on the Earth and number 22 to 29 represents 8 Starlink satellites. Each user is connected to 4 different Starlink satellites, and thus, all the users can access high-speed Internet. In addition, all 8 Starlink satellites are connected to each other to form the strongest signaling node, used for users to access the fastest Internet from one place to another. From this, we have 30 vertices and 110 edges. I determined that this graph is considered connected because all the vertices are connected to each other, and there are no disjoints. For the degree of sequence, 22 components have 4, one with 13, one with 17, and six with 19 degrees. The subgraph of vertices requires a degree higher than 5.5. Hence, only eight vertices are left, which are 8 Starlink satellites. The topic is unique and demonstrates how Starlink's internet service works. Starlink's internet topic would be surely distinguishable from others.