Name that Network

Connecting Wireless Devices

Goal:

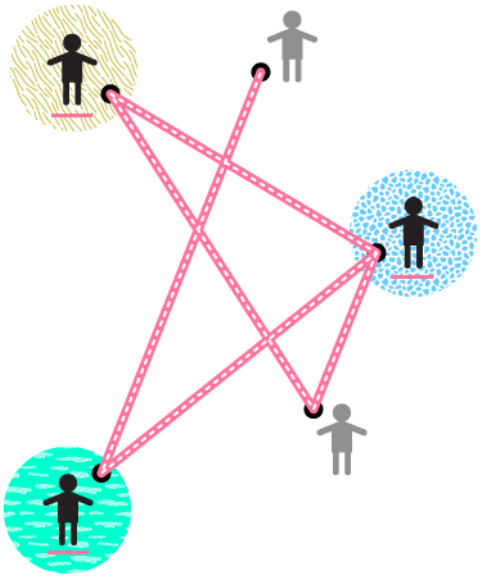
Identify key characteristics of different network structures.

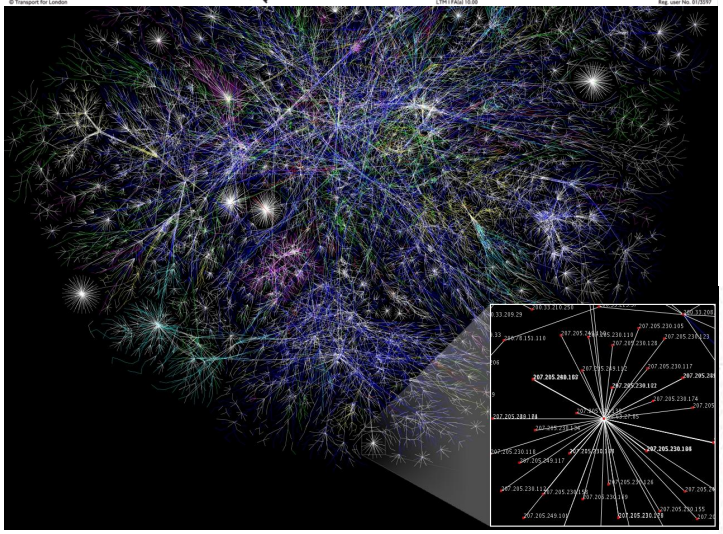
Why?

In order to design a network, we need to understand the basics of how networks are structured.

There are many types of networks

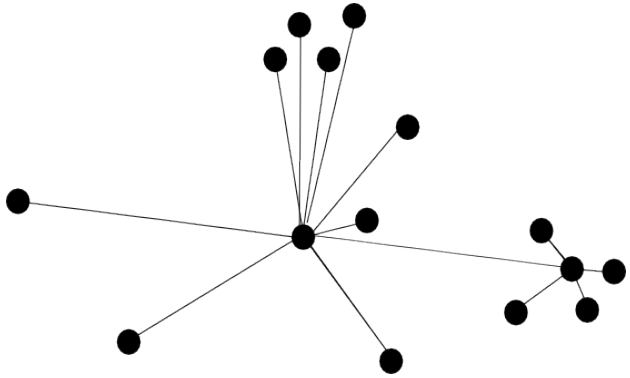
Think of 3-5 different networks.

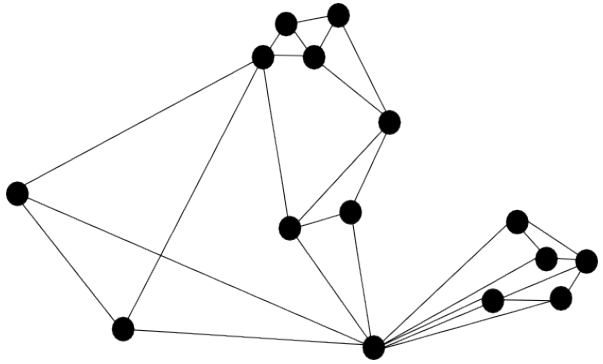


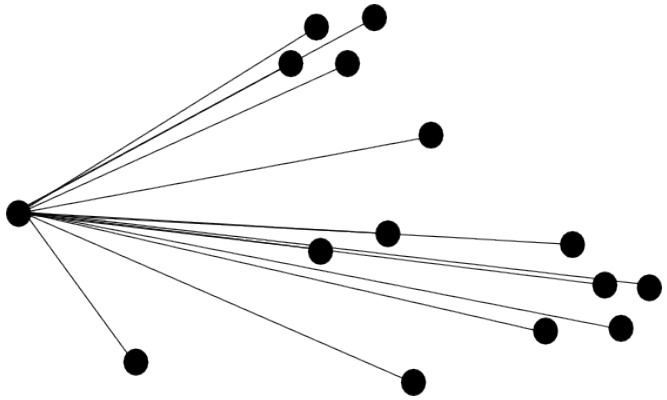


Different networks have different properties

Describe each of these networks in a few words.





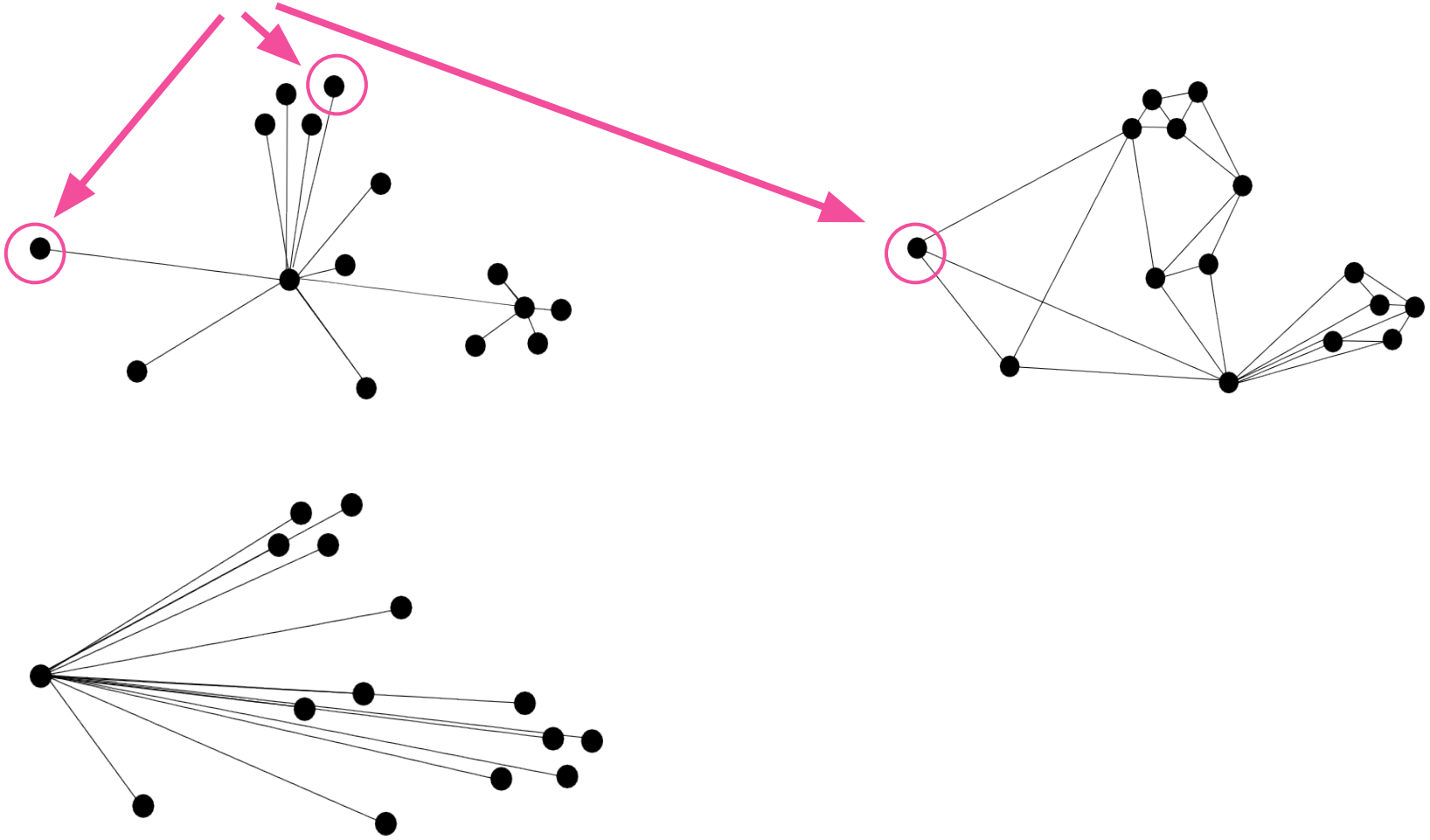


DID YOU NOTICE?

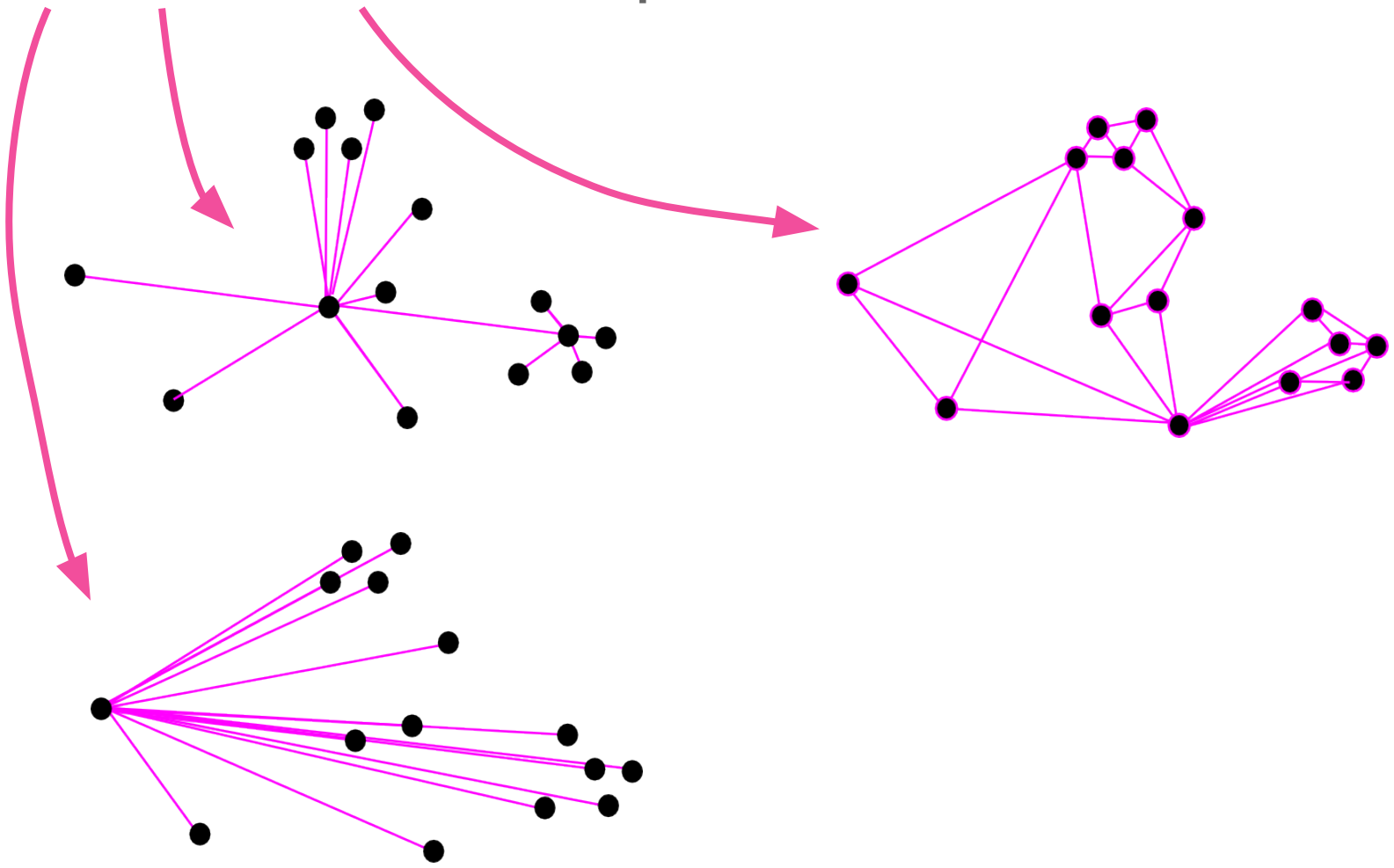
They are the same points connected in different ways.

Networks have

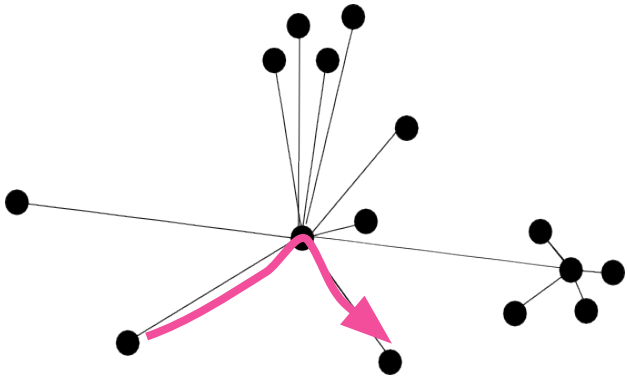
NODES connected in the network.

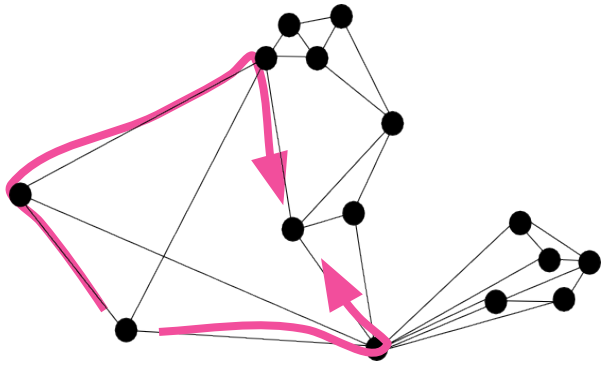


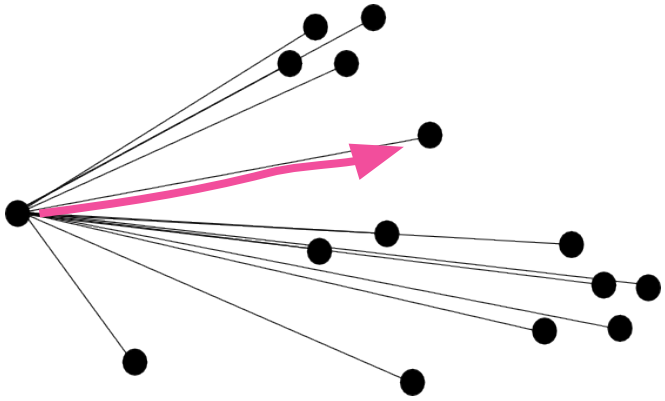
Networks have STRUCTURE or shape.



Networks have
ROUTING from point to point.

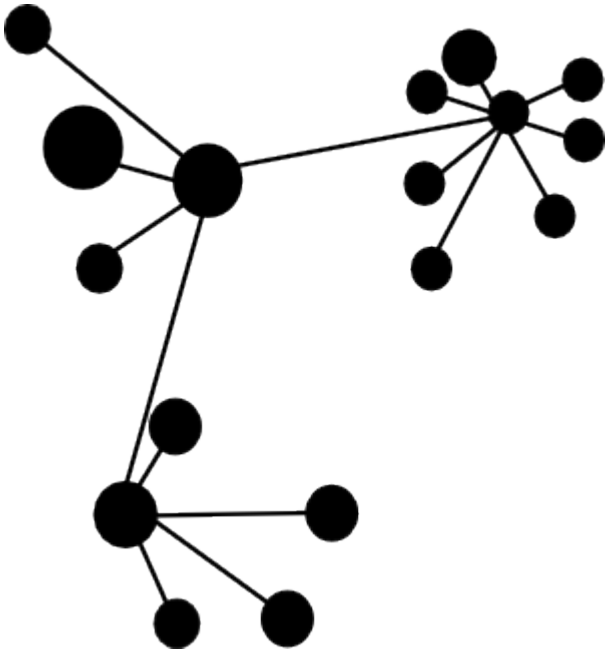


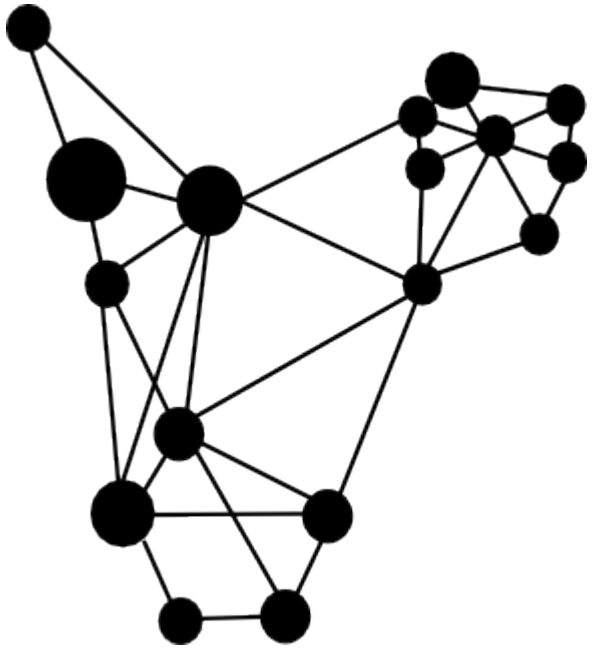


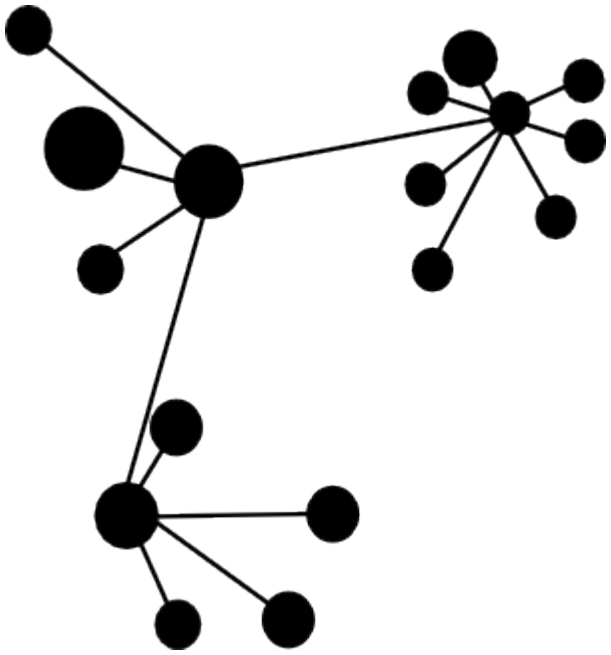


Let’s compare two networks.

How are they different? How are they the same?



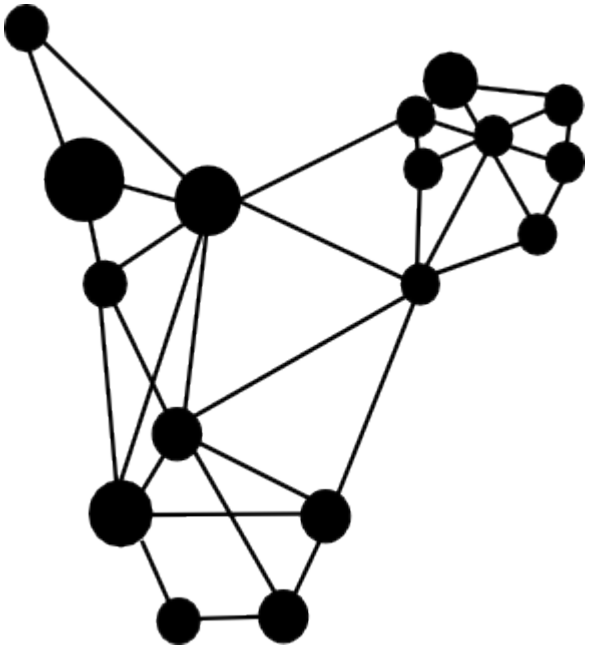




QUESTION:

How many ways are there to go between any two nodes?

These nodes only have one choice.

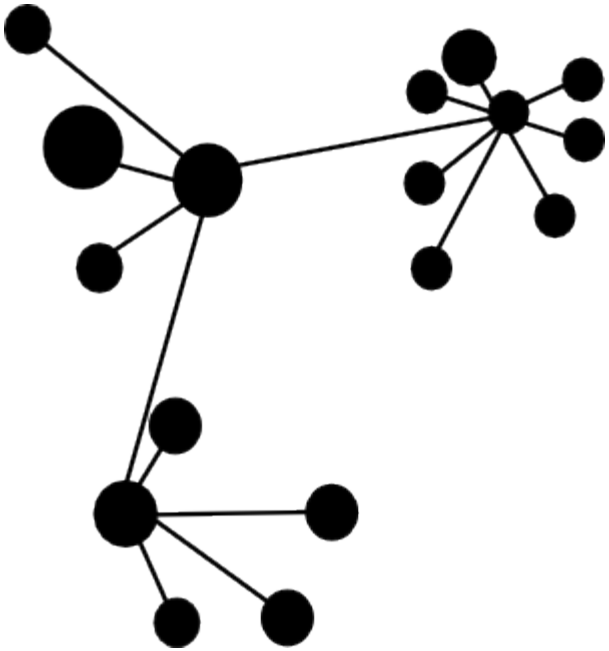


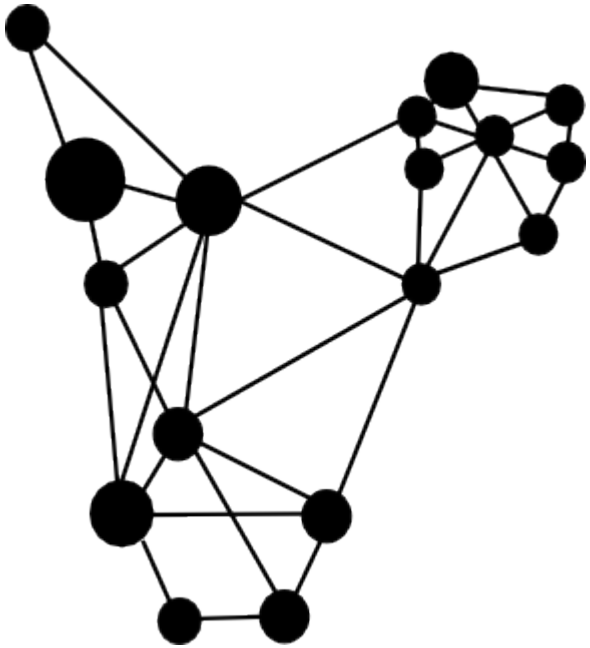
QUESTION:

How many ways are there to go between any two nodes?

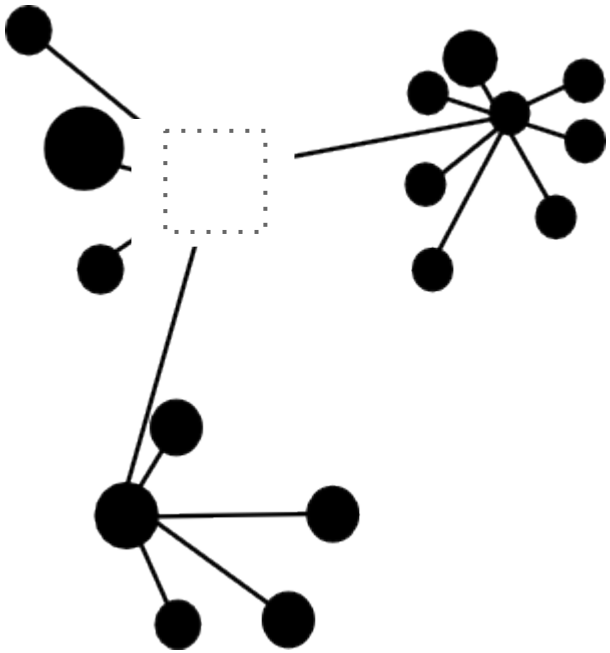
Most of these nodes can choose among many options.

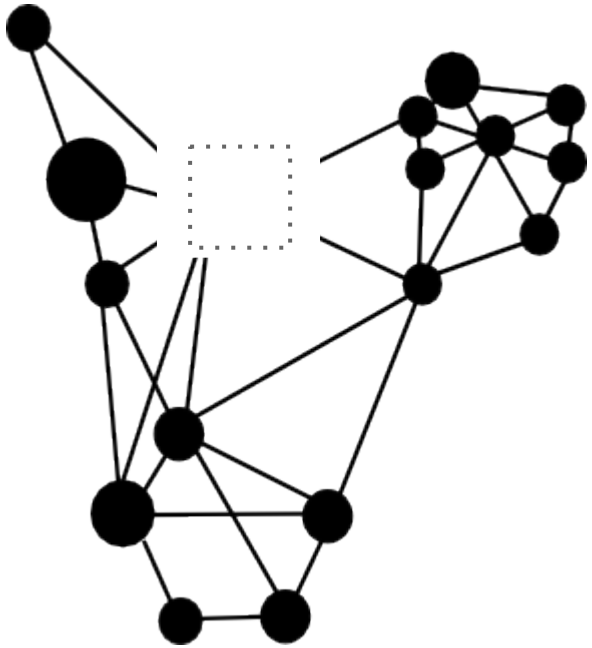
Which network is more centralized?
Which network is more decentralized?



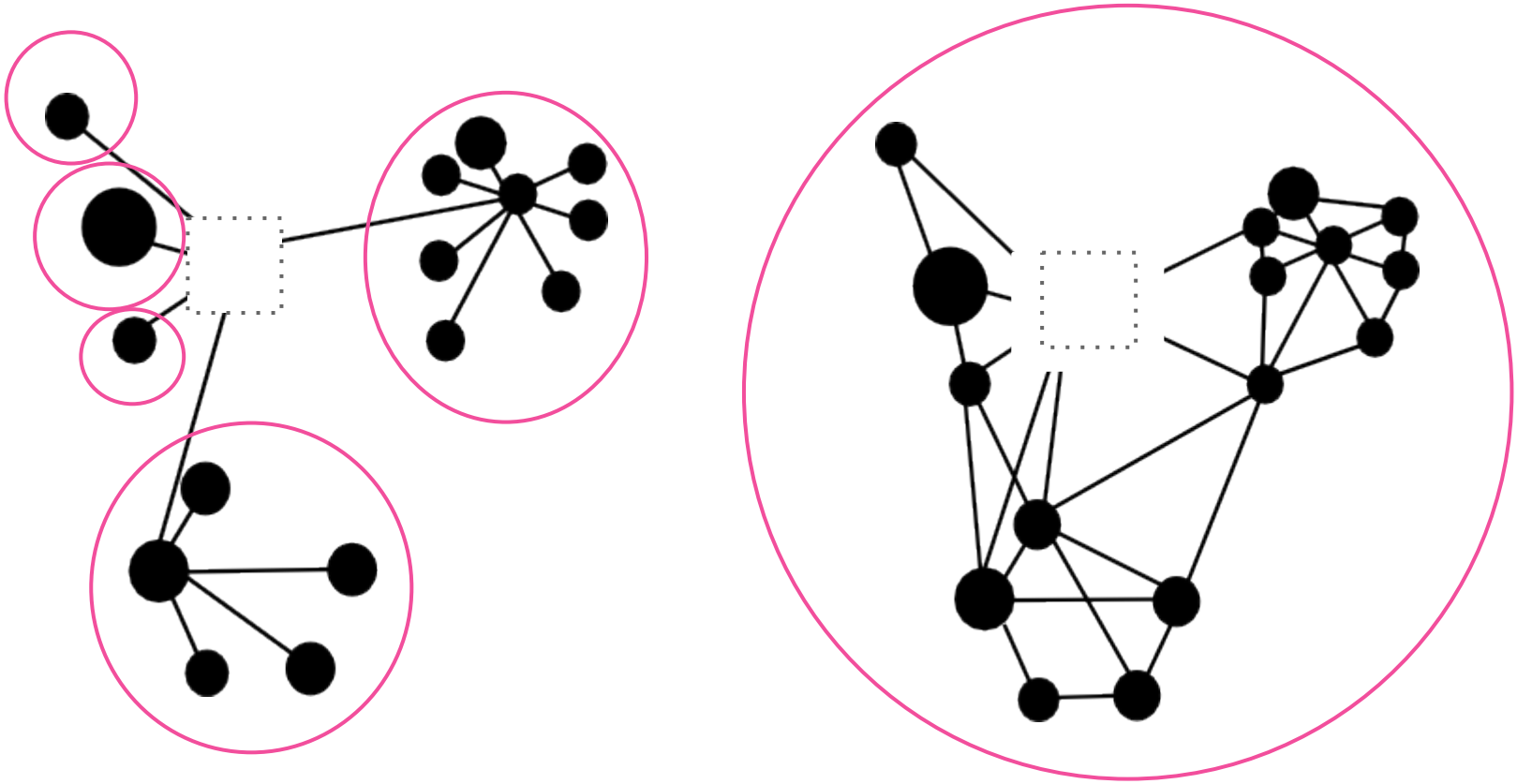


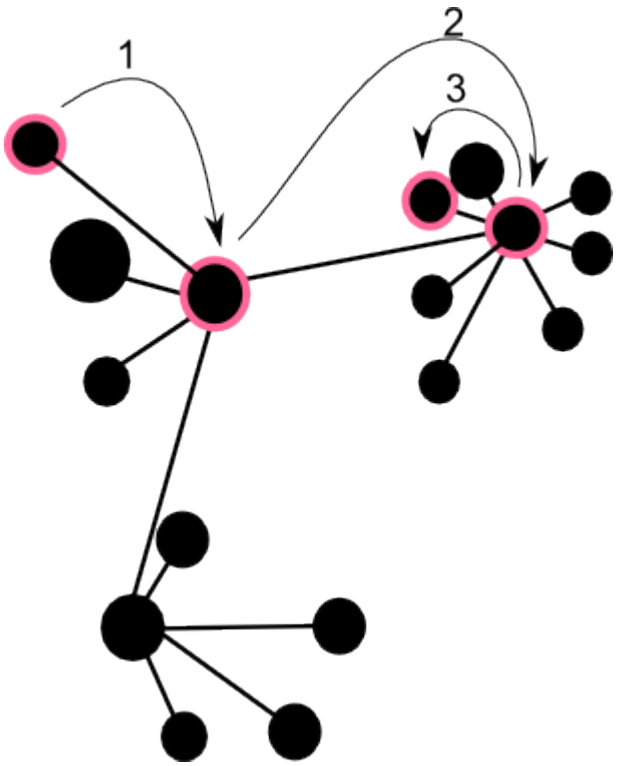
What happens to each network when one node is removed?
Why is that important?





Some networks tend to stay connected
and are built without central points of failure.

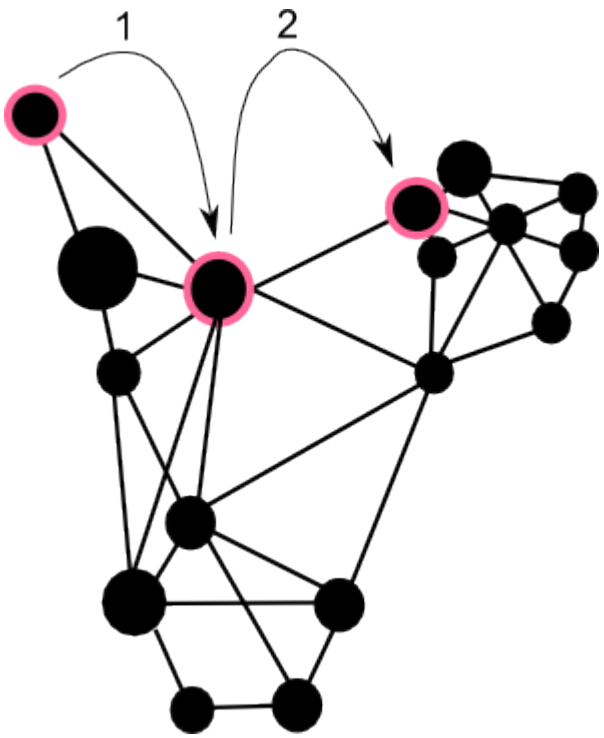




QUESTION:

How many hops (connections) does it take to go from one end node to another?

3 to 4 hops.



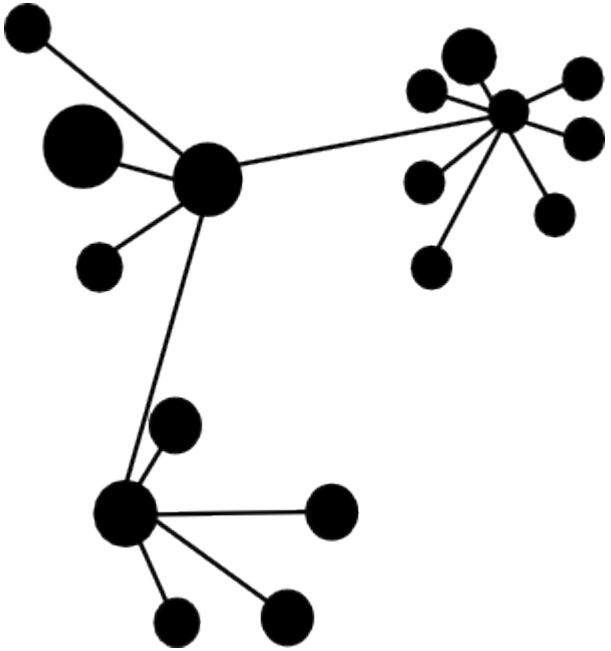
QUESTION:

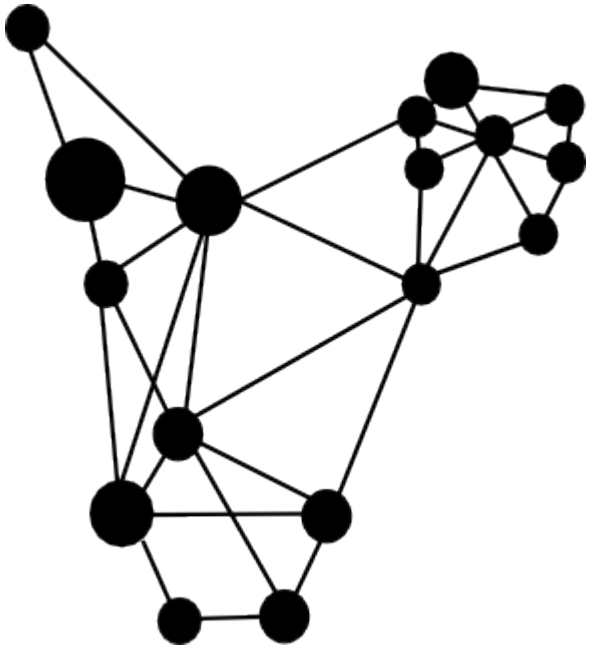
How many hops (connections) does it take to go from one end node to another?

Depending on the route, 1 to 5 hops.

Why is the number of hops important?

Each hop can impact the performance of the network.

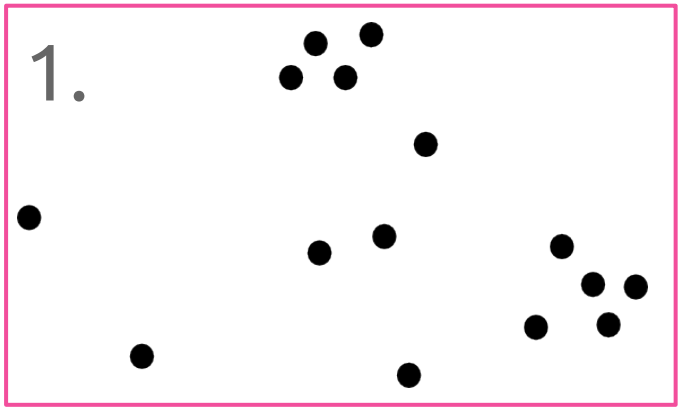




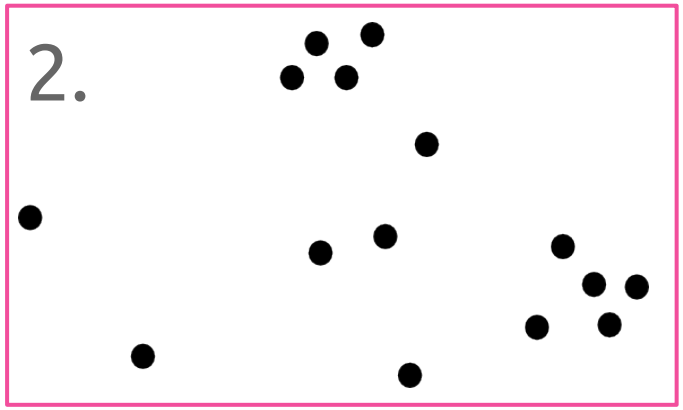
Activity: Connect the dots to build a network

Try it four times

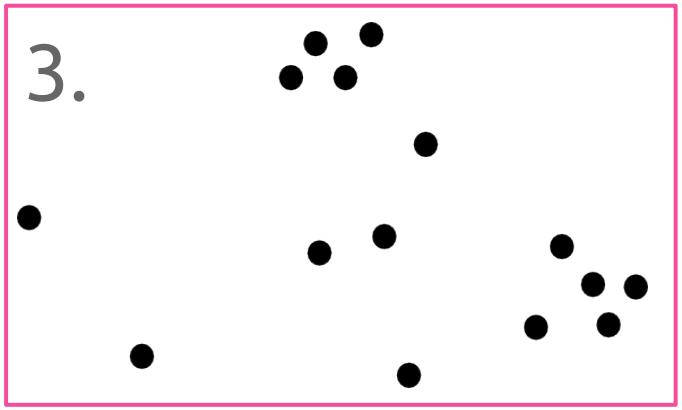
1.



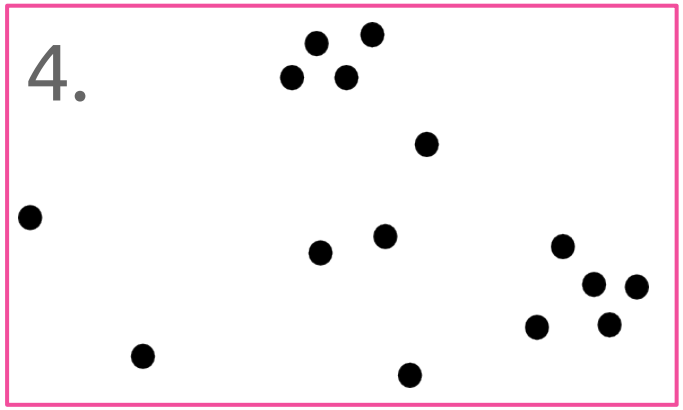
2.



3.



4.



Activity: Describe the networks you drew:
10 minutes

(1) Describe the network in a few words.

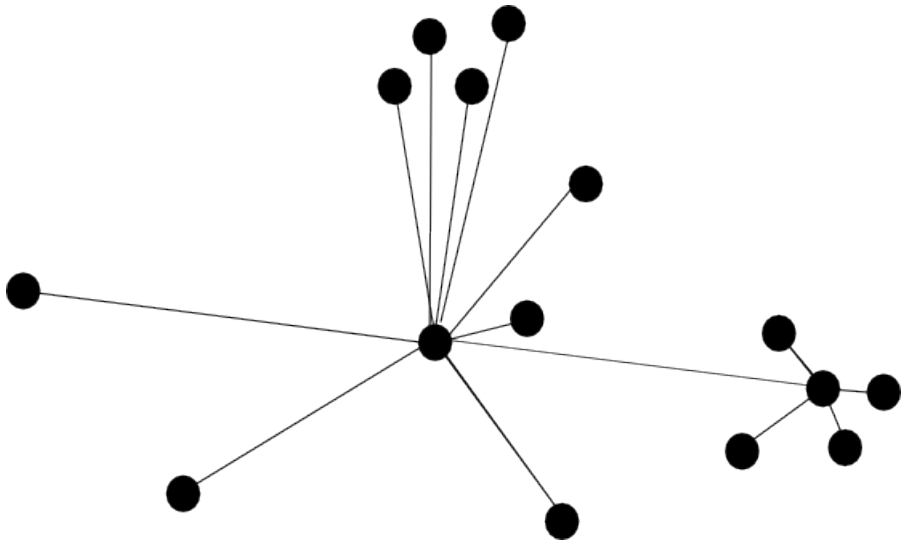
(2) What are a few potential advantages of each network?

(3) What are a few potential disadvantages of each network?

(4) What could be the real world use of each network?

Connect the dots to build a network

Example 1



Description: Two connected networks; hub and spoke; two centers.

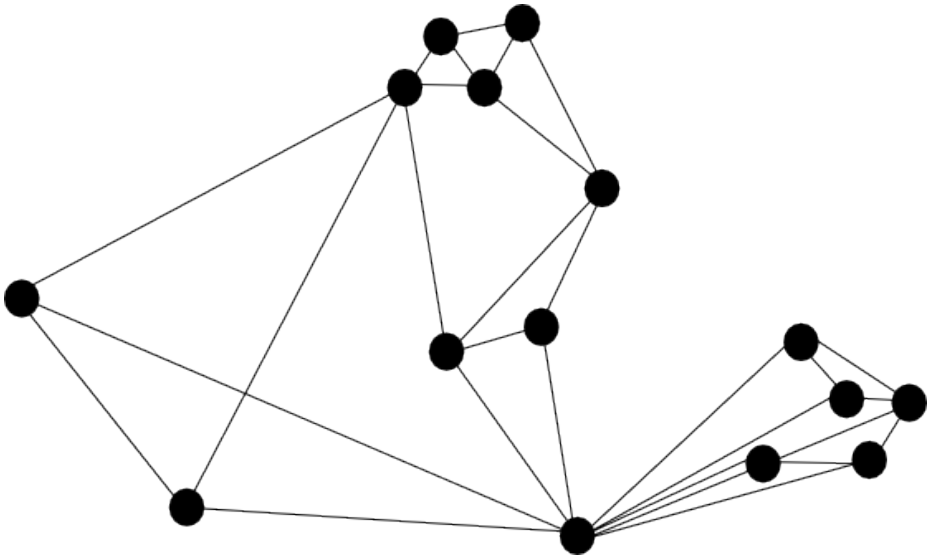
Advantages: Efficiently distributes information. Every end node is three hops from every other end node.

Disadvantages: If the one or two critical points in the network fail, the network is disconnected.

Real world: Providing internet access from the center point to the other areas.

Connect the dots to build a network

Example 2



Description: Mesh; highly connected.

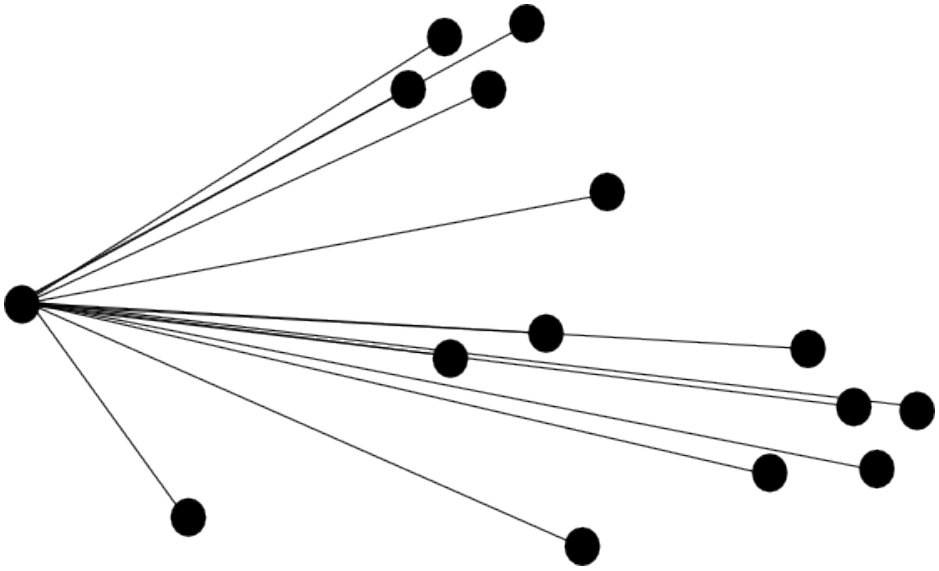
Advantages: Because there are so many paths, the network can easily reroute traffic and optimize routes.

Disadvantages: It takes some nodes many hops (5!) to get to other nodes.

Real world: Neighbors connecting to each other.

Connect the dots to build a network

Example 3



Description: one point connecting all others.

Advantages: Simple design and easy routing.

Disadvantages: A single point of failure. Nodes next to each other must go through a single point. The central node takes all the traffic, which could overwhelmed.

Real world: Telephone company connecting customers from a single point.