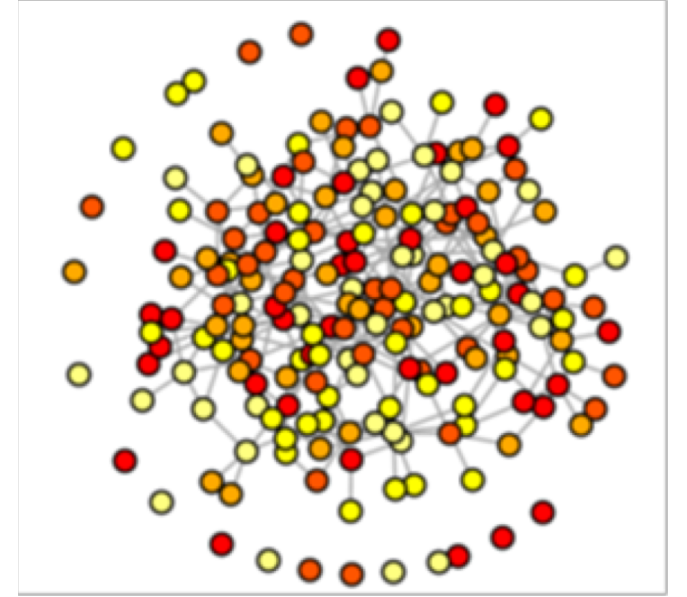


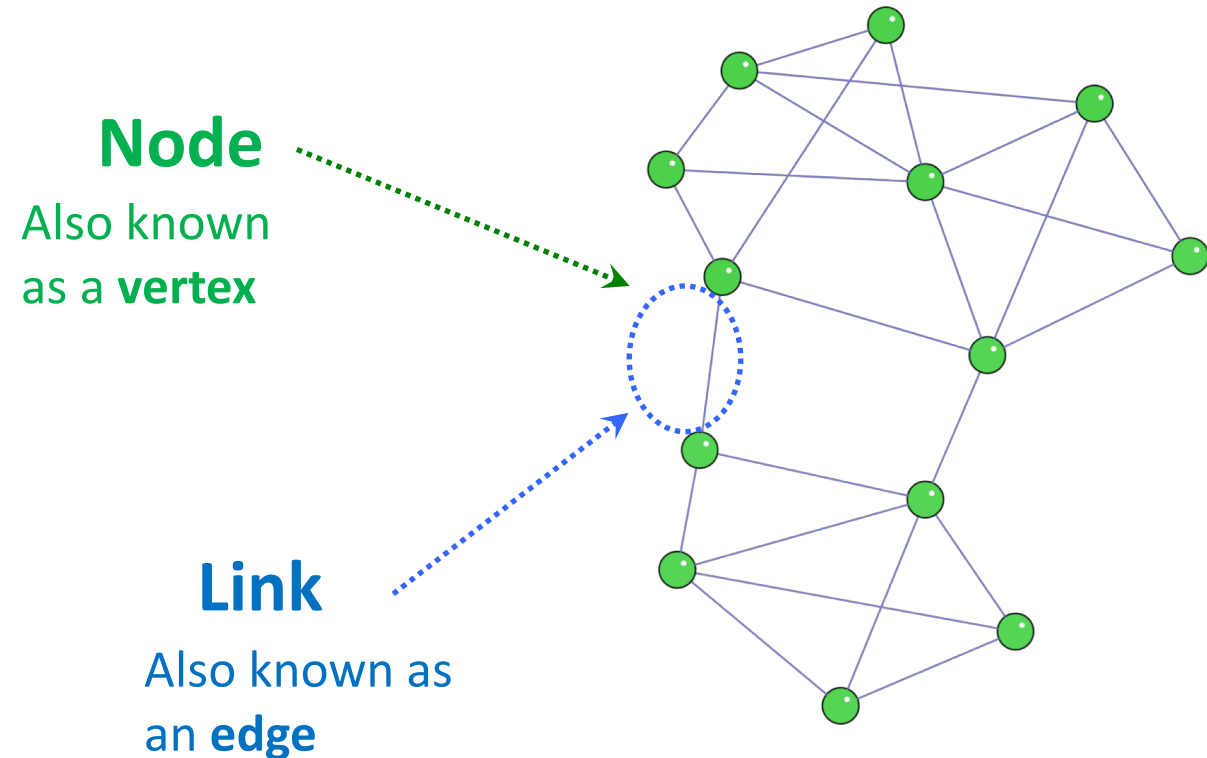
Networks in R

garrettlab.com



What is a network? Some key terms

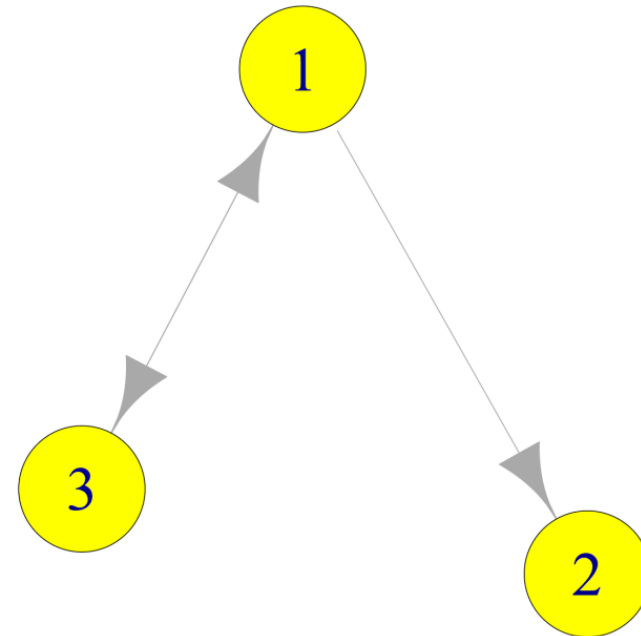
- **Nodes**
- **Edges**
- **Dyads** – two nodes
- **Triads** – three nodes



A network is basically an adjacency matrix

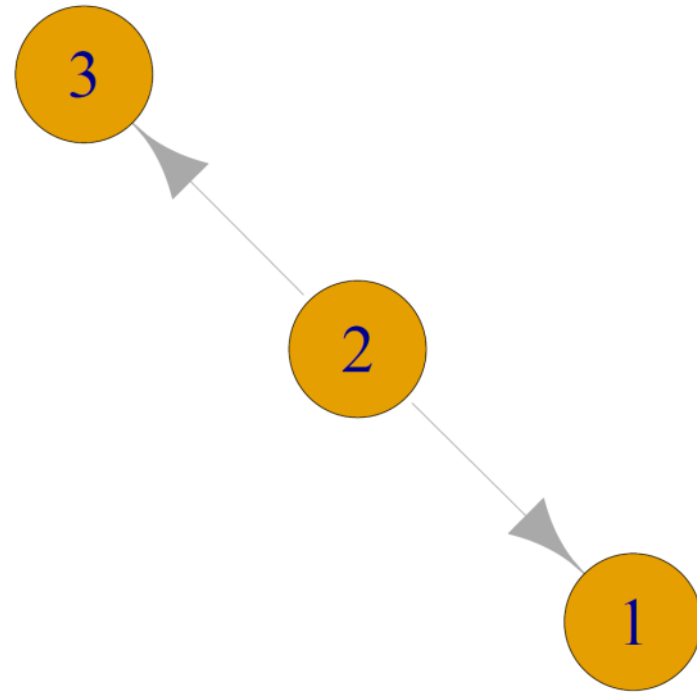
- An adjacency matrix is a square matrix that describes a network, where each element of the matrix indicates whether a link exists between two nodes (and potentially also includes information about the weight associated with that link)

	To		
	N1	N2	N3
From			
Node1	0	1	1
Node2	0	0	0
Node3	1	0	0



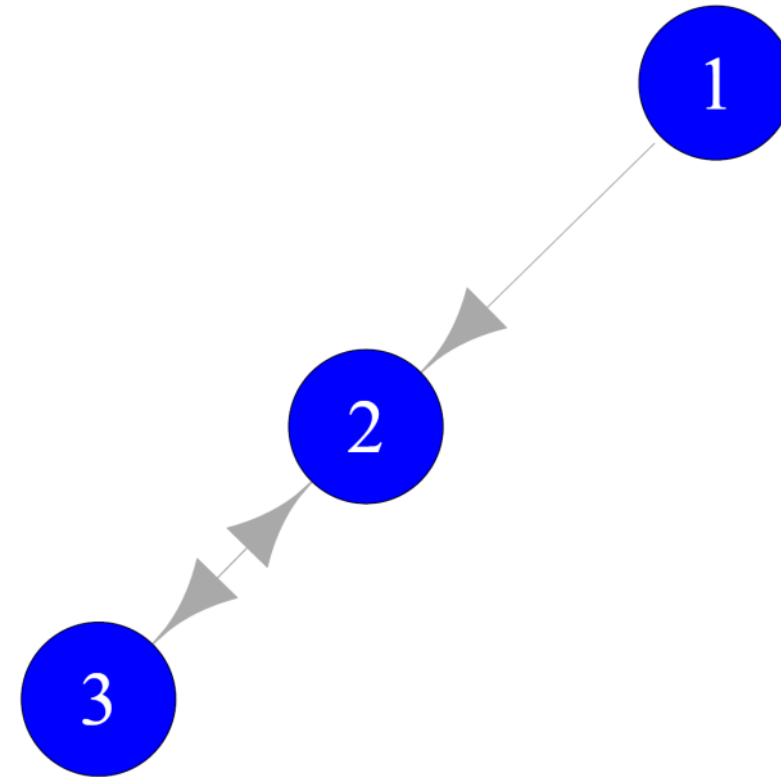
Can you draw what this network would look like?

	To		
	N1	N2	N3
From			
N1	0	0	0
N2	1	0	1
N3	0	0	0



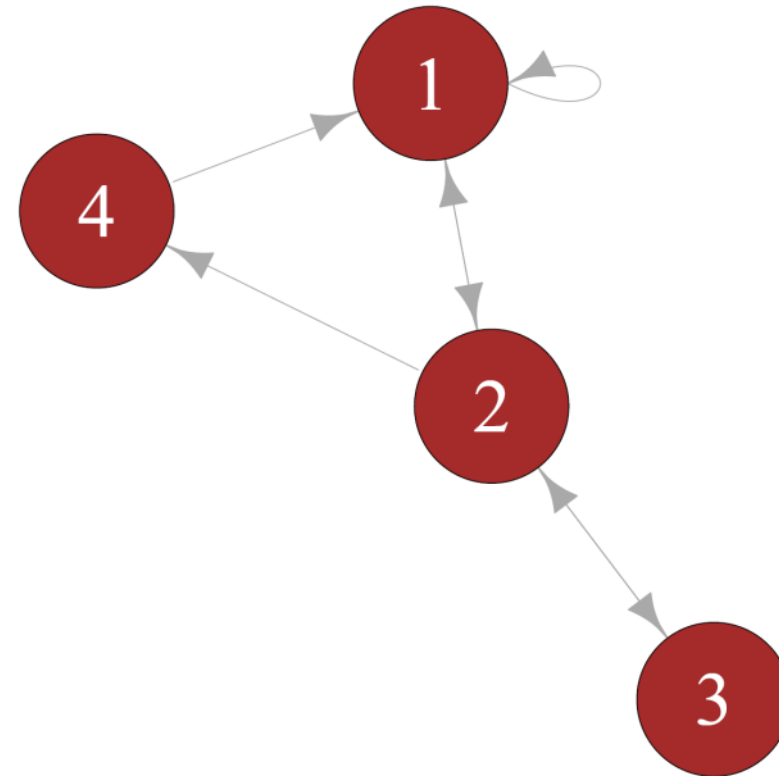
How about this adjacency matrix?

	To		
	N1	N2	N3
From			
N1	0	1	0
N2	0	0	1
N3	0	1	0



Network example 3

	To			
	N1	N2	N3	N4
From				
N1	1	1	0	0
N2	1	0	1	1
N3	0	1	0	0
N4	1	0	0	0



Directed or undirected network?

	To		
	N1	N2	N3
From			
N1	0	1	0
N2	0	0	1
N3	0	1	0

	To		
	N1	N2	N3
From			
N1	0	1	0
N2	1	0	1
N3	0	1	0

Symmetric!

Examples of general questions to ask with networks

- What nodes and links have particularly important roles in the network?
- Are there clusters of nodes?
- How “complex” is the network?
- What would strengthen or weaken the network?

Today we will do most of our work in the igraph package in R

- igraph reference manual
 - <http://igraph.org/c/doc/igraph-introduction.html>
 - Definitely a reference – more detail than you might want to read through for a first try
- Katya Ognyanova has prepared some user friendly introductions
 - Network visualization: <http://kateto.net/network-visualization>
 - igraph in R: <http://kateto.net/networks-r-igraph>

Let's move to the markdown!

kelseyandersen.github.io/NetworksPlantPathology/

Networks in Plant Pathology Welcome Introduction to R ▾ Networks in R ▾ Additional Resources ▾

Networks with igraph

- Network data types
- Describing networks
- Bonus: Does my network deviate from random?

Visualizing and Analyzing Networks

Kelsey Andersen, Robin Ch

Networks with igraph

First, make sure you have loaded package *igraph*.

```
#install.packages("igraph")
library(igraph)
```

```
##
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:dplyr':
##
##   as_data_frame, groups, union
```

```
## The following objects are masked from 'package:purrr':
##
##   compose, simplify
```