

# Complex Networks

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# Random graphs

# The configuration model

# Our ensemble

In our particular case, we define a random graph ensemble  $\mathcal{G}$  such that:

- the graph has  $N$  nodes;
- the graph is generated using the configuration model;
- the graph doesn't contain self-edges and multiple edges;
- we define a parameter  $\pi$  and the the graph is such that the fraction of the nodes  $p_1 = 1 - \pi$  has degree 1, and the remaining fraction  $p_4 = \pi$  has degree 4.

# Examples of random graphs

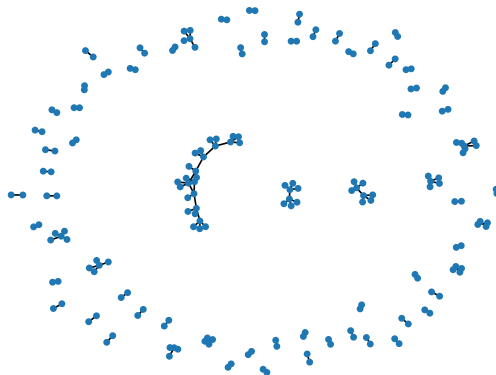


Figure: Instance of a random graph for  $\pi = 0.1$

# Examples of random graphs

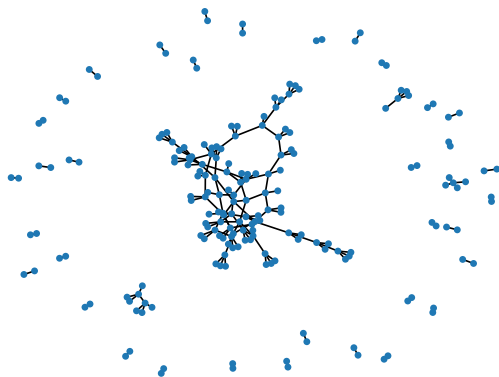


Figure: Instance of a random graph for  $\pi = 0.3$

# Examples of random graphs

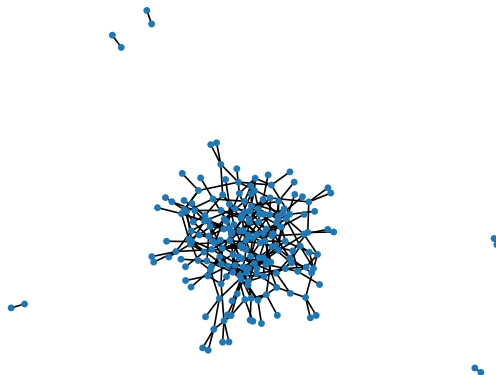
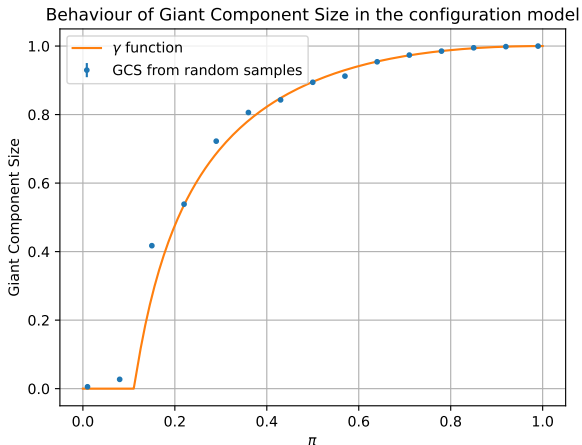


Figure: Instance of a random graph for  $\pi = 0.7$

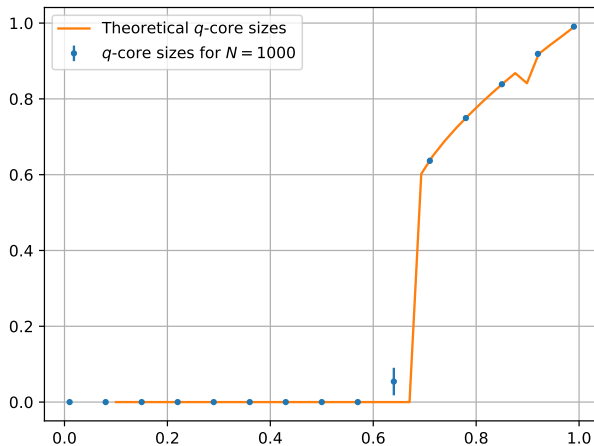
# The size of the giant component



**Figure:** Comparison between theoretical value and measures from random instances of the size of the giant component



# The size of the 3-core



**Figure:** Comparison between theoretical value and measures from random instances of the size of the 3-core