	Network Science	
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Weak Ties, Triadic Closure, Closure, Structral Holes, Social Capital

7.1 Three Graph Models

7.1.1 Degree Sequence

Given a graph as shown in Figure 7.1, we can put the degrees of all nodes in a sequence $\overline{d}$, such a sequence is called a degree sequence. The example graph in Figre 7.1 has a degree sequence of $\overline{d} = (3, 3, 3, 2, 2, 1)$

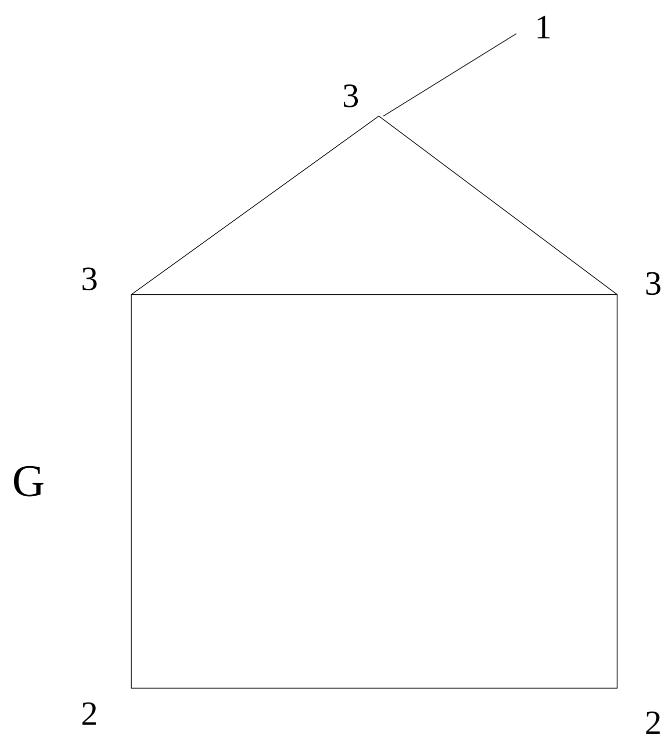

Figure 7.1: Example 1.

Definition 1 *Graphical* A degree sequence $\overline{d}$ is graphical if $\exists$ a graph G, *s.t.* $deg\_seq(G) = \overline{d}$, where G is a simple graph (no loops or multi-edges)

Theorem 1 *Havel-Hakimi* Given a degree sequence $\overline{d} = (d_1, d_2, ..., d_n)$, it is graphical *iff* $(d_2 - 1, d_3 - 1, ..., d_{d_1} - 1, d_{d_1+2}, ..., d_n)$ is graphical

Whe the graph size is large, we can also plot a degree distribution of the graph.

7.1.2 Random Graph

7.1.3 Scale-Free or Power-Law Distribution

7.1.4 Chung-Lu Model

7.1.5 Applications of graph models

Internet robustness study.

7.2 Weak Ties and Triadic Closure

Granovetter studied

7.2.1 Clustering Coefficient

Clustering Coefficient (CC) is defined as:

Approximation Of the Average CC

Anil Vullikanti, etc developed an approximation algorithm to calculate the average CC value. Here is the procedures:

- Given a graph G, sample s nodes uniformly at random
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