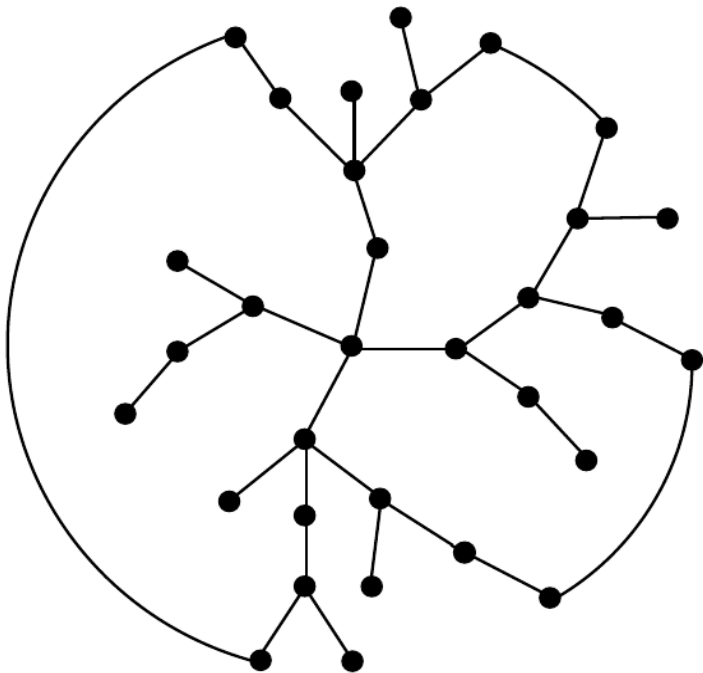


# Global Topology Of Networks -6.1

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1. What the network looks like
2. Search in networks
3. Average shortest-path length
4. Birth of the giant component
5. Core of a net
6. Distribution of finite connected components



$$\frac{kP(k)}{\bar{k}}$$

$$\begin{aligned}
 C &= \sum_{k_1, k_2} \frac{k_1 P(k_1)}{\bar{k}} \frac{k_2 P(k_2)}{\bar{k}} \frac{(k_1 - 1)(k_2 - 1)}{N \bar{k}} \\
 &= \frac{\bar{k}}{N} \frac{(\langle k^2 \rangle - \bar{k})^2}{\bar{k}^2}
 \end{aligned} \tag{6.1}$$

$$\sum_k k \frac{kP(k)}{\bar{k}} = \frac{\langle k^2 \rangle}{\bar{k}} \quad (6.2)$$

$$z_2 = \langle k^2 \rangle - \bar{k} \quad (6.3)$$

$$k_{cut} \sim k_0^m N^{(m-1)/(\gamma-1) - (\gamma-2)/(\gamma-1)} \quad (6.4)$$

$\gamma < 3$ :

$$z_2 \cong \langle k^2 \rangle \sim k_0^2 N^{(3-\gamma)/(\gamma-1)}$$

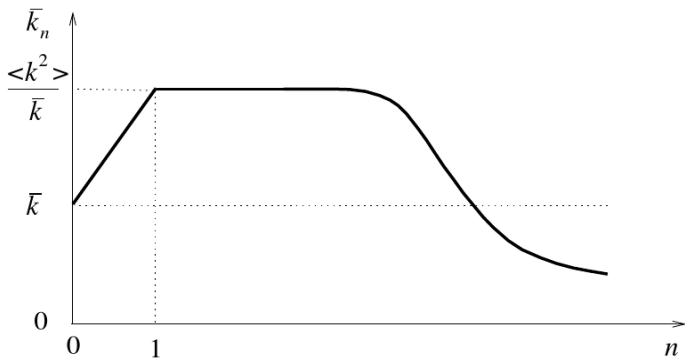
$\gamma = 3$ :

$$z_2 \cong \langle k^2 \rangle \approx k_0^2 \ln N$$



$$C = \frac{z_2^2}{Nz_1^3} \quad (6.6)$$

$$C \sim k_0 N^{(7-3\gamma)/(\gamma-1)} \quad (6.7)$$



$$t_s(N) \approx \frac{1}{k} N^2 (\gamma - 2)(\gamma - 1)$$

$$\bar{l} \approx \frac{\ln(N/z_1) + \ln[(z_2 - z_1)/z_1]}{\ln(z_2/z_1)}$$

M. E. J. Newman, S. H. Strogatz, and D. J. Watts-2001

$$z_2 > z_1$$

$$W = 1 - \sum_{k=0}^{\infty} P(k) x^k$$

