notes

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```
In [2]: %pylab inline

Populating the interactive namespace from numpy and matplotlib


In [6]: import networkx as nx
        import pandas as pd
        import seaborn as sns
        import scipy as sp
        import scipy.stats as sps

In [7]: sns.set_style('white')
        sns.set_context('notebook')
```

0.1 Lecture 3

0.1.1 Power laws, Preferential Attachment, and master equations

0.1.2 April 5, 2016

Emergenceo of a Giant Component in Erdos-Renyi Random Graphs

```
In [8]: G = nx.random_graphs.erdos_renyi_graph(100, .1)

In [43]: def random_graph_maxc(N=100):
             P = np.arange(0,1,.001)
             graphs = [nx.random_graphs.erdos_renyi_graph(N, p) for p in P]
             c_max = [float(len(next(nx.connected_components(g)))) for g in graphs]

             return pd.Series(c_max, index=P*N)

In [45]: maxc_df = pd.DataFrame([random_graph_maxc() for _ in xrange(10)])

In [51]: maxc_df.median().plot(logx=True, logy=True)

Out[51]: <matplotlib.axes._subplots.AxesSubplot at 0x153d49c90>
```
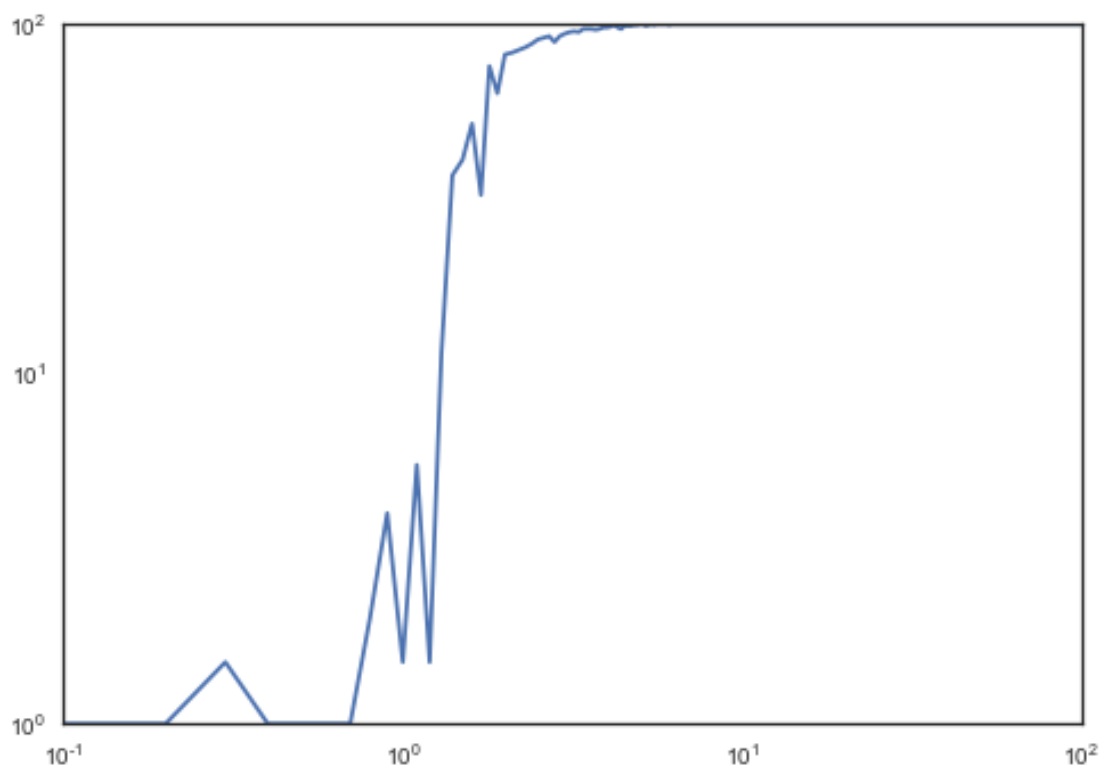
Preferential Attachment

- $P_r(t + 1 \rightarrow n_j) = d_j / \sum_i d_i$

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