Graphs

Ruth Anderson
UW CSE 160
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A graph contains nodes and edges
+ 350 students in no romantic and/or sexual relationship
From: “Chains of Affection: The Structure of Adolescent Romantic and Sexual Networks”, *American Journal of Sociology*, by Peter Bearman of (Columbia), James Moody (Ohio State), and Katherine Stovel (U. of Washington);
Graphs

• A graph can be thought of as either of:
  – a collection of edges
    • Each edge represents some relationship
  – for each node, a collection of neighbors
    • The neighbors are those connected by an edge
Operations on a graph

Creation:
• Create an empty graph

Querying:
• Look up a node: Does it exist? What are its neighbors?
• Look up an edge (= a pair of nodes): does it exist? (You know the nodes it connects.)
• Iterate through the nodes or edges

Modification:
• Add/remove a node
• Add/remove an edge
networkx Graph Library

• Used in Homework 4

```python
import networkx as nx
g = nx.Graph()
g.add_node(1)
g.add_node(2)
g.add_edge(1, 2)
print g.nodes()
print g.edges()
```

Note: It is also o.k. to just add an edge before you add the individual nodes; the nodes will be added for you in that case.
Installing networkx Graph Library

Two ways to Install:

Through the GUI:
- In Canopy select Tools-> Package Manager
- In the left hand panel, click on “Available " and then type "networkx“ in the search box in the upper right
- Once found, click the Install button.

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On the command line: Open up a terminal and type:

```
  pip install networkx
```

To check if you have networkx installed, type:

```
  import networkx
```
in the python interpreter in Canopy. If it is installed properly nothing should happen, but if it is NOT installed you will get an error message.
import networkx as nx
import matplotlib.pyplot as plt

g = nx.Graph()  # Creates a graph

# Adds edge from node 1 to node 2
g.add_edge(1, 2)
# Adds node 4
g.add_node(4)

print g.edges()
print g.nodes()
print g.neighbors(1)

assert len(g.nodes()) == 4
assert len(g.edges()) == 2

nx.draw_networkx(g)  # Draw the graph
plt.show()  # Show the graph in a separate window