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# Tony Hyun Kim
# CS 224w, PS 3, Problem 4
# Generate the graphs and save to file
import random
import snap

# Target parameters
n = 10670 # Number of nodes
m = 22002 # Number of edges

# Generate the random network
#-----
G1 = snap.TUNGraph.New()

for nid in range(n):
    G1.AddNode(nid)

x = 0 # Counter for number of random edges added
while (x < m):
    n1 = random.randint(0, n-1)
    n2 = random.randint(0, n-1)
    if (not G1.IsEdge(n1,n2) and (n1 != n2)):
        G1.AddEdge(n1,n2)
        x += 1

snap.SaveEdgeList(G1, "gnm.txt")
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% Tony Hyun Kim
% CS 224w, PS 3, Problem 4
% Generate the preferential attachment graph
clear all; close all;

n = 10670; % Number of nodes
m = 22040; % (Maximum) number of edges

edges = zeros(m,2);
ei = 0; % Number of edges currently in list

% Begin with a complete graph of 40 nodes
%-----
n_seed = 40;
for ni = 0:(n_seed-2)
    for nj = (ni+1):(n_seed-1)
        ei = ei + 1;
        edges(ei,:) = [ni nj];
    end
end

% Next, we add new nodes that make two random, preferential edges
% to the existing network
%-----
for ni = n_seed:(n-1) % Each incoming node
    for k = 1:2 % makes two edges by
        re = randi(ei); % choosing a random prior edge, and
        nj = edges(re,randi(2)); % choosing one of the endpoints

        ei = ei + 1;
        edges(ei,:) = [ni nj];
    end
end

dlmwrite('pa.txt', edges, 'delimiter', ' ');
```