Population Migration

% population
%H. Gollwitzer, June 29, 1998. This M-file organizes the matrix computations mentioned in the migration computational project.

% A is the migration matrix
% Column 1 describes the migration pattern from the city
% Column 2 gives the pattern from the suburbs
% The first entry in column 1 is the proportion who stay
% in the city and the second entry those that leave for suburbs
% A similar interpretation holds for the second column with
% respect to the suburbs. cs is the initial number of city and
% suburban dwellers, respectively.

%All proportions deal with a period of one year.
p = .125;% proportion who leave city for suburbs
%1-p: proportion who stay in city

q = .03;% proportion who leave suburbs for city
%1-q: proportion who stay in suburbs

A = [(1-p) q; % The migration matrix
     p  1-q];

%Initial city population is 500 and suburbs is 50, in thousands.
cs = [500 50];

history = cs;%storage for population data
pOld = cs; % current population
years = 55;% 55 may not be enough in some cases.

for k = 1:years
    pNew = A*pOld; % population after one year using matrix product
    history = [history pNew];% This vector holds the population history
    pOld = pNew;% This assignment gets ready for next iteration(year).
end

%history(1,:) represents city population over time
%history(2,:) represents suburban population over time.

time = 0:(size(history,2)-1);% list of years

% Plot the time history of city and suburban populations for as
% many years as indicated by the for loop.
Suburban population is marked with '*' in green, while that of the city is '+' in blue.
Plot history vs. time, create string for title, and place same.

```matlab
plot(time,history(1,:),'b+',time,history(2,:),'g*');
titlestr = sprintf('City/Suburban Population Migration With p = %5.3g\',p);
title(titlestr); % Place title on current figure.
% Check help xlabel or help ylabel for axis labeling.
```

City/Suburban Population Migration With p = 0.125