Solutions to Homework 1 - Introduction

1 Lower bounded random walk.

A Simulation of a process realization. The function is already provided in the ECE440 class website; follow http://www.ece.rochester.edu/

```
figure; hold on; grid on; xlabel('bet index');
ylabel ('wealth (in $)'); axis([0,max_t,0,400])% create new figure.

for p=p_vector % p takes the values in p_vector one at each run of the for loop.
      [w, t, h] = ssas_gambling(w_0, b, p, max_t); % Run experiment;
                                                                        % see file "ssas_gambling.m".
      plot(w); % plot the bet's history.
end
```

The resulting plot of the three process realizations is shown in Fig. 1.

Fig. 1. Simulated processes for $w_0 = 20$ and $p = 0:25$; $p = 0:5$ and $p = 0:75$ (Part A)

B Probability of reaching home. When determining the number N of experiments to run, it is important to keep in mind that more experiments lead to greater accuracy, and the only drawback to increasing experiments is an increase in runtime. This function will begin with $N = 100$ experiments, but will rerun with $N = 1000$ experiments if too few players go bankrupt (which could be an indication of a not large enough sample size). The required function follows:

```
% Function estimating the probability of reaching home
% as a function of the winning probability 'p' and initial wealth 'w_0'
% The function makes sure there are least 10 home-reaching realizations or
% otherwise the simulation is performed 1000 times. This roughly prevents
% innacurate estimations based on too few samples.

function pr_r_h = pr_reaching_home(w_0, p)
b = 1;          % Amount bet at every time.
T=100;          % Simulation will run for at most max_t iterations.
N=100;          % Initial number of experiments.
i = 0           % Index.
nr_reaching_home=0; % Counter initialization.
while (nr_reaching_home<10) && (N<=1000)
      nr_reaching_home=0; % reset after checking condition
      for i=1:N
            [w, t, h] = ssas_gambling(w_0, b, p, T);
```