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% gambler.m for Math 152
% Code for showing the time evolution of gambler's ruin.
clear all ;
D = 10 ;    % Total of gambler's stake plus the house's stake
d = 2 ;    % The gambler's initial stake.
w = 0.49 ; % The probability of the gambler's winning each hand.
T = 10 ;   % final time

P = zeros(D+1,D+1);
P(1,1) = 1;
P(D+1,D+1) = 1;
for j = [2:D]
    P(j+1,j) = w;
    P(j-1,j) = 1-w;
end

X= zeros(D+1,1) ;
X(d+1) = 1 ;

disp( ['The gambler starts with ', num2str(d)] )
disp( ['The house starts with ', num2str(D-d)] )
disp( ['The probability that the gambler wins a hand is ', num2str(w)] )
disp(' ')
% disp('The probability transition matrix is'), P

for t= [0:T]
    disp( [ 'At time ', num2str(t) , ', the gambler has probability distribution' ] )
    disp( num2str(X', '%4.3f ') )
    disp(' ')
    X = P*X ;
end

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