

```

function [R,P] =
cmpt_P_and_R(lambdaRequests,lambdaReturns,max_n_cars,max_num_cars_can_transfer)
%
% Notes: checked 2007-12-10 (no mistakes found)
%
% Written by:
% --
% John L. Weatherwax          2007-12-03
%
% email: wax@alum.mit.edu
%
% Please send comments and especially bug reports to the
% above email address.
%
%-----

if( nargin==0 )
    lambdaRequests=4;
    lambdaReturns=2;
    max_n_cars=20;
    max_n_cars_can_transfer=5;
end

PLOT_FIGS=0;

% the number of possible cars at any site first thing in the morning:
nCM = 0:(max_n_cars+max_num_cars_can_transfer);

% return the average rewards:
if false,
    % OLD CODE: which has no dependency on car rental returns but seems to gives results
    that exactly match the figures in the book
    R = zeros(1,length(nCM));
    for n = nCM,
        tmp = 0.0;
        for nr = 0:(10*lambdaRequests), % <- a value where the probability of request is very
small.
            tmp = tmp + 10*min(n,nr)*poisspdf( nr, lambdaRequests );
        end
        R(n+1) = tmp;
    end
else
    % NEW CODE (old code above did not have any dependence on car rental returns; bug found
    by Valentina Vadori)
    R = zeros(1,length(nCM));
    for n = nCM,
        tmp = 0.0;
        for nreq = 0:(10*lambdaRequests), % <- a value where the probability of request is
very small.
            for nret = 0:(10*lambdaReturns), % <- a value where the probability of returns is
very small.
                tmp = tmp + 10*min(n+nret,nreq)*poisspdf( nreq, lambdaRequests )*poisspdf( nret,
lambdaReturns );
            end
        end
        R(n+1) = tmp;
    end
end
end

```

```
if( PLOT_FIGS )
    figure; plot( nCM, R, 'x-' ); grid on; axis tight;
    xlabel(''); ylabel(''); drawnow;
end

% return the probabilities:
P = zeros(length(nCM),max_n_cars+1);
for nreq = 0:(10*lambdaRequests), % <- a value where the probability of request is very
small.
    reqP = poisspdf( nreq, lambdaRequests );
    % for all possible returns:
    for nret = 0:(10*lambdaReturns), % <- a value where the probability of returns is very
small.
        retP = poisspdf( nret, lambdaReturns );
        % for all possible morning states:
        for n = nCM,
            sat_requests = min(n,nreq);
            new_n = max( 0, min(max_n_cars,n+nret-sat_requests) );
            P(n+1,new_n+1) = P(n+1,new_n+1) + reqP*retP;
        end
    end
end
end
if( PLOT_FIGS )
    figure; imagesc( 0:max_n_cars, nCM, P ); colorbar;
    xlabel('num at the end of the day'); ylabel('num in morning'); axis xy; drawnow;
end
```