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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% This program considers a mass m1 with initial velocity v1 = 1,          %
% colliding with a mass m2 with initial velocity v2 = 0.                  %
% The mass ratio is mr = m1/m2 = 100^n. After the first elastic collision,%
% m2 collides (also elasticly) with a wall. The question is: given n      %
%(exponent) of the mass ratio, how many collisions there are between the  %
% masses and between m2 and the wall?                                     %
% THE ANSWER IS THE FIRST n DIGITS OF PI!                                 %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

clear all;
clc;

%%%%%%%%%%%%%%%
% Parameters %
%%%%%%%%%%%%%%%
tic

n = [0:1:7];            % exponent of mass ratio

for r = 1:length(n)
    v1 = 1;             % m1 initial velocity
    v2 = 0;             % m2 initial velocity
    mr = 100^n(r);      % mass ratio

    colcount(r) = 0;    % collision counter

    while not(v1 <=0 && v2 <=0 && abs(v1) > abs(v2))     % stop counting collision↙
if...
        v1aux = (mr - 1)/(mr + 1)*v1 + 2/(mr + 1)*v2;    % m1 velocity after collision
        v2aux = 2*mr/(mr + 1)*v1 + (1 - mr)/(mr + 1)*v2; % m2 velocity after collision
        colcount(r) = colcount(r) + 1;
        if v2aux > 0                                     % collision of m2 with wall
            v2 = - v2aux;
            colcount(r) = colcount(r) + 1;
        else
            v2 = v2aux;
        end
        v1 = v1aux;
    end
end
[n' colcount']
toc
```