

# Colliding Balls (Bonus)

## ZPRAC-16-17-Lab2

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[Bonus Question]

Note - This question will be evaluated only if solutions of all 3 lab questions are submitted.

There is a rectangular table of dimensions  $L \times R$ .  $n$  balls are placed on the table at any random positions. After placing, the balls start moving with constant speed ( $V$ ). The direction of movement for each ball can be different and is random. If any two balls collide with each other while moving, they undergo a perfect elastic collision and change their velocity(direction and speed) according to the laws of elastic collision.

Given  $L$ (in meters,  $0 \leq L \leq 10^4$ ),  $R$ (in meters,  $0 \leq R \leq 10^4$ ),  $n$ ( $2 \leq n \leq 10^4$ ) and  $V$ (in meters/sec,  $0 < V \leq 10^4$ ), you need to output the minimum time ( $T$ ) in which there is surety with probability 1 that all balls will fall off the table.

Input:

Four numbers  $L$ ,  $R$ ,  $n$  and  $V$ .

$L$ ,  $R$  and  $V$  are real numbers while  $n$  is a positive integer.

Output:

Time  $T$  in seconds (3 decimal places).

Note - you can use math functions (if required) from math.h - sqrt(n), pow(n,i), cos(r), sin(r), log(x) etc. If you are not sure how to use them, ask tutors and TAs in the lab.

Example:

Input:

1.5 2.4 5 1.2

Output:

Time(in seconds): 2.358