COMP1200-MatLab - Lab 05
Due midnight – Thursday – September 29
Submit `devPlan05.txt` and `Lab05.m` **via Blackboard**

Before you start writing your program:

Read all of these instructions carefully. The **`devPlan05.txt`** file. at the assignment link is an incomplete development plan. You are to save the file and edited it by adding your name and the date and by completing: 1. STATE THE PROBLEM and 2. DESCRIBE THE INPUT AND OUTPUT REQUIREMENTS. Use the development plan as a guide when writing the m-script file solution for the following problem. **This file must be saved as a .txt file.**

NOTE: You will see later that the spelling and casing of file names is very important in MATLAB. Your submitted file(s) MUST be spelled and cased as instructed. [-5 points per file for not doing so.]

***Problem*:**

***Program*: Lab05.m**

On a hot Saturday afternoon, you and your friends notice an empty baby swimming pool on the lawn of your apartment complex. So, why not see if you can fill it with water from water balloons thrown from your second floor balcony.

We waited long enough—it's time to find out how many balloons it takes to fill the pool. Keep in mind that not every throw will hit the pool, so a lot of balloons will be thrown. To process a large number of balloon throws, you will run use a random number generator to provide the values needed to compute the distance **a balloon** travels as well as the diameter of **a balloon**. The balloon diameter determines the amount of water in a balloon.

You will continue "throwing" balloons while the pool is not full, i.e. while the total amount of water from the "hit" balloons is less than the capacity of the pool. When the pool is full, your program should print the total number of balloons thrown, the number of balloons that hit the pool, and percent of hits.

***Problem Constants*:**

```
BAL_HEIGHT = 12;                    % balcony height (feet)
G = 32;                             % gravitational acceleration
POOL_CENTER = 35;                   % distance to the center of pool (feet)
MIN_ANGLE = 5;   MAX_ANGLE = 85;    % degrees
MIN_VEL   = 1;   MAX_VEL   = 30;    % ft/sec
MIN_HT    = 4.5; MAX_HT    = 7;     % feet
MIN_DIAM  = 3;   MAX_DIAM  = 9;     % inches
CAPACITY  = 7;                      % pool capacity in gallons.
```

***Problem Inputs*:**

See previous assignments and these instructions.

***Problem Outputs*:**

See previous assignments and these instructions.

***Other variables*:**

See previous assignments and these instructions.

Balloon	
diameter inches	volume gallons
3	0.1
4	0.2
5	0.3
6	0.55
7	0.8
8	1.25
9	1.7

Instructions:

- ☐ Insert comments at the top and throughout each file
  - o Include the follow comments at the beginning of this (and ALL) files.
    - % your name
    - % assignment number
    - % date you completed the assignment
    - % a short narrative about what the file does
  - o Use your development plan as a guide for comments throughout each file
- ☐ Use `clc` and `clear all` at the beginning of your program.
- ☐ Use descriptive variable names.
- ☐ Use Sample Input/Output as a guide.
- ☐ No extra output, i.e., use semicolons!
- ☐ Initialize the counters and accumulator.
- ☐ Think carefully about what needs to be done before the loop, in the loop and after the loop.
- ☐ Use the rand() function to get the needed values. See Problem Inputs.
- ☐ Use the **switch/case** structure to determine the volume of water in the balloon for a given balloon diameter.
  - o Because a "case" criteria is a number and not a range, you will need to use the **round()** function to get a whole number for the diameter. The value from the rand() will not be an integer.
- ☐ The input values are vector of random number.
- ☐ Compute distance.
- ☐ Print the output with appropriate labels.
  - o Use the `format` command that suppresses extra line-feeds

-5 points per file for absence of any of these required comments at the top

New commands:
`rand(1)`
`round`
`while`
`switch/case`
`format` to suppress extra line-feeds
initialize counters and accumulators

***Other information*:**

Use your text and help to find information on the following:

The rand() function. NOTE: For this assignment, you want to **get only one sets of input value at a time** when using rand(). Use the equation for the previous assignment and put a one as the argument with rand, i.e., **rand(1)**.

The round() function.

Documentation and comments:

Use major section comments for constants, initialization, input, computation, and output. Separate sections with a blank line.

Use other comments and blank lines as needed for clarity of what you program is doing. Use comments of the same line VERY sparingly, if any.

To insure that your code is indented properly use "Smart Indent." This can be done by highlighting your code and right clicking.

Sample Input/Output:

There is not one set of answers for this assignment. The following are from separate executions.

```
Number of balloons that hit the pool
     9
Number of balloons that were thrown
   423
Percent of balloons that hit the pool
    2.1277

Number of balloons that hit the pool
    14
Number of balloons that were thrown
   657
Percent of balloons that hit the pool
    2.1309
```

Submit via Blackboard:

`devPlan05.txt`	Software development method
`Lab05.m`	MATLAB script file