CS344 Lab 4 – Trajectory

Due: 9/25/09
Points: 20

Purpose

To use a While loop to predict the trajectory of a projectile using FORTAN and MATLAB.

Process

In this lab we will compute the distance and height of a projectile given its initial velocity and the angle of the projectile. The distance is computed using the following formulas:

distance = velocity*time*cos(angle)
height = velocity*time*sin(angle)-1/2*g*time2**

The angle will be entered by the user in degrees. The formulas above uses radians so you will need to convert their input into radians. There are 57.29577951 degrees per radian. **g** is the acceleration due to gravity and is 32 feet/second^2.

Step 1

Create a FORTRAN program that prompts the user for:

- Initial velocity in feet per seconds
- Initial angle in degrees

Compute the distance and height of the projectile and display theses values every second until the projectile hits the ground. Your output should be clear and similar to the following:

```
Enter the velocity (feet/second) of the projectile:
500
 Enter the angle (Degrees) of the projectile:
45
 Seconds:    1 Distance:   353.55 Height:   337.55
 Seconds:    2 Distance:   707.11 Height:   643.11
 Seconds:    3 Distance:  1060.66 Height:   916.66
 Seconds:    4 Distance:  1414.21 Height:  1158.21
 Seconds:    5 Distance:  1767.77 Height:  1367.77
 Seconds:    6 Distance:  2121.32 Height:  1545.32
 Seconds:    7 Distance:  2474.87 Height:  1690.87
 Seconds:    8 Distance:  2828.43 Height:  1804.43
 Seconds:    9 Distance:  3181.98 Height:  1885.98
 Seconds:   10 Distance:  3535.53 Height:  1935.53
 Seconds:   11 Distance:  3889.09 Height:  1953.09
 Seconds:   12 Distance:  4242.64 Height:  1938.64
 Seconds:   13 Distance:  4596.19 Height:  1892.19
 Seconds:   14 Distance:  4949.75 Height:  1813.75
 Seconds:   15 Distance:  5303.30 Height:  1703.30
 Seconds:   16 Distance:  5656.85 Height:  1560.85
 Seconds:   17 Distance:  6010.41 Height:  1386.41
 Seconds:   18 Distance:  6363.96 Height:  1179.96
 Seconds:   19 Distance:  6717.51 Height:   941.51
 Seconds:   20 Distance:  7071.07 Height:   671.07
 Seconds:   21 Distance:  7424.62 Height:   368.62
 Seconds:   22 Distance:  7778.18 Height:    34.17
```

Step 2

Your MATLAB results should appear similar to the following:

```
>> Trajectory
Enter the velocity: 500
Enter the angle: 45
Time:      1  Distance: 353.55  Height: 337.55
Time:      2  Distance: 707.11  Height: 643.11
Time:      3  Distance: 1060.66  Height: 916.66
Time:      4  Distance: 1414.21  Height: 1158.21
Time:      5  Distance: 1767.77  Height: 1367.77
Time:      6  Distance: 2121.32  Height: 1545.32
Time:      7  Distance: 2474.87  Height: 1690.87
Time:      8  Distance: 2828.43  Height: 1804.43
Time:      9  Distance: 3181.98  Height: 1885.98
Time:     10  Distance: 3535.53  Height: 1935.53
Time:     11  Distance: 3889.09  Height: 1953.09
Time:     12  Distance: 4242.64  Height: 1938.64
Time:     13  Distance: 4596.19  Height: 1892.19
Time:     14  Distance: 4949.75  Height: 1813.75
Time:     15  Distance: 5303.30  Height: 1703.30
Time:     16  Distance: 5656.85  Height: 1560.85
Time:     17  Distance: 6010.41  Height: 1386.41
Time:     18  Distance: 6363.96  Height: 1179.96
Time:     19  Distance: 6717.51  Height: 941.51
Time:     20  Distance: 7071.07  Height: 671.07
Time:     21  Distance: 7424.62  Height: 368.62
Time:     22  Distance: 7778.17  Height:  34.17
>>
```

Turn in your work along with sample output.