

Test on introduction to programming

The use of computer is necessary. The solution of the problems has to be a unique file (pdf, word or something similar). The file has to include the solution and the codes used

PROBLEM 1

We want to analyze the marks obtained by a group of students in an exam. The objective is to obtain the mean value, the variance and the standard deviation of the results of all the students, The mean, μ , is defined as

$$\mu = \frac{1}{N} \sum_{k=1}^N x_k$$

and the variance, v

$$v = \frac{1}{N-1} \sum_{k=1}^N (x_k - \mu)^2$$

being x_k each of the N points in the data set. Write a Matlab/Octave script to:

1. Create a random vector named marks with size (100,1). This vector must have random numbers between 0 and 10. These are the marks obtained by students.
2. Create a loop to obtain the mean value of the marks and store it.
3. Using the previous result, create a new loop to obtain the variance.
4. Check the results using the built-in functions `std()` and `var()` in Matlab/Octave.

PROBLEM 2

A projectile shot from the ground, with an inclination angle α and an initial velocity v_0 , will follow a parabolic movement. The distance reached by the projectile (x_{max}), the maximum height (y_{max}) and the flight time (t) can be obtained by,

$$x_{max} = \frac{v_0^2 \sin(2\alpha)}{g}, \quad y_{max} = \frac{v_0^2 \sin^2(\alpha)}{2g}, \quad t = \frac{2v_0 \sin(\alpha)}{g}$$

1. Write a Matlab/Octave function called `parabolic()` which has inputs v_0 and α and gives the outputs x_{max} , y_{max} and t .



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