

Assignment 4

Create a new directory with the name Assignment4.

Use this directory to save all programs that you will create as part of this assignment.

General

This chapter is about *methods*. During the construction of your programs you should be using methods as much as possible.

Part 1 Vis-Viva equation:

The so-called Vis-Visa equation calculates the velocity of a spacecraft or planet in its orbit. It has been given in:

<http://aerospacescholars.jsc.nasa.gov/HAS/Modules/Earth-to-Mars/10/mission.cfm>

Use the formula given as $v = 1.6 \times 10^{10} (1/r - 1/[2a])^{1/2}$ to construct a method `speedVisViva(...)` that accepts a and r as parameters and returns the speed of a satellite.

Include the method in a working program. Make sure your method is called from `main()` and correctly returns a value to `main()`. Have `main()` display the value returned. Test the method by passing various values to it. e.g.: on leaving the Earth orbit and upon entering the Mars orbit. Search on the web for appropriate values for distances between celestial bodies.

Part 2

Redo your assignment 3 part 1.

This time, the calculations should be separated out as a method.

- Let `main()` do the declaration and initialization of both arrays.
- Pass both arrays to a method; this method should create a third array containing the square of the difference between the corresponding elements of array1 and array2, i.e. : $\text{array3}_i = (\text{array1}_i - \text{array2}_i)^2$. The method should return the array3 to `main()`.
- Pass array3 to another method which will print out all the values in array3. This method should print a variable number of values per line; indicated by a parameter n supplied by `main()`.
- Pass array3 to yet another method finding the maximum value in array3. This value should be returned to `main()` and `main()` should print this value.

Part 3 Random

Write a program to play a numeric version of the game of mastermind. The aim of the game is to guess a secret code which is a sequence of four digits (0 .. 9). Using a random generator, the program generates four digits and compares these to a stored secret number. For this simple program is it sufficient to have only one try:

- you establish a 'secret' number,
- you draw four random digits in the range 0 .. 9,
- you compare these digits with the digits in the 'secret' number,
- you report the number of occurrences where a drawn digit is equal to *any* of the digits in the 'secret' number. There is no need to test on equal digits being in the same position; such is for a later extension of this program.

See also http://en.wikipedia.org/wiki/Mastermind_%28board_game%29 for the classical version of this game. Hint: Call `Math.random()` to generate a random number. Divide the possible values out of `Math.random()` into equal intervals and return the number of the interval that a given random number falls into. Read about `Math.random()` on page 232 of the book.