

## Computer Skills (AY 2015/16)

Prof. Valeria Cardellini

### Homework 2 (lessons from 6 to 9)

#### Exercise 1)

Consider a row vector  $V$  and the problem to find the minimum element of  $V$  and its index in the vector.

- Define the algorithm to solve the problem and represents the algorithm using a flow chart.
- Write a MATLAB script that prints as output the minimum element of  $V$  and its index in the vector (in case of more than one occurrence of the minimum, return the index of the first occurrence).  $V$  can be randomly generated within the code.

*Example:* if  $V = [3, 5, 4, 2, 6, 1, 1]$ , then the minimum element of  $V$  is 1 and its index in the vector is 6.

#### Exercise 2)

Consider a value  $x$  and a row vector  $V$  and the problem to find if  $x$  is contained in  $V$  and if found which is its index in the vector.

- Define the algorithm to solve the problem and represents the algorithm using a flow chart.
- Write a MATLAB script that prints 0 as output if the given value  $x$  is not contained in  $V$ , otherwise its index in  $V$  (in case of more than one occurrence of the value  $x$ , return the index of the first occurrence). The value of  $x$  must be entered by the user and  $V$  can be randomly generated within the code.

*Example:* if  $V = [3, 5, 4, 2, 6, 1, 1]$  and  $x=6$ , then the result is 5. if  $V = [3, 5, 4, 2, 6, 1, 1]$  and  $x=7$ , then the result is 0.

#### Exercise 3)

Consider a row vector  $V$  and the problem to find the mean value of the elements of  $V$ .

- Define the algorithm to solve the problem and represents the algorithm using a flow chart.
- Write a MATLAB script that prints as output the mean value of a given vector  $V$ .  $V$  can be randomly generated within the code. Do not use the sum and mean built-in functions in MATLAB.

*Example:* if  $V = [3, 5, 4, 2, 6, 1, 1]$ , then the result is  $22/7=3.14286$ .

#### Exercise 4)

Consider a row vector  $V$  and the problem to find the minimum and maximum elements of  $V$  and their index in the vector.

- Define the algorithm to solve the problem and represents the algorithm using a flow chart.
- Write a MATLAB script that prints as output the minimum and maximum elements of  $V$  and their indexes in the vector (in case of more than one

occurrence of the minimum/maximum, return the index of the first occurrence). *V* can be randomly generated within the code.

*Example:* if  $V = [3, 5, 4, 2, 6, 1, 1]$ , then the minimum and maximum elements of *V* are 1 and 6, respectively, and their indexes in the vector are 6 and 5, respectively.

### **Exercise 5)**

Consider a row vector *V* and the problem to find the mean value of the elements of *V* and the index of the element closest to the mean.

- a) Define the algorithm to solve the problem and represents the algorithm using a flow chart.
- b) Write a MATLAB script that prints as output the mean value of a given vector *V* and the index of the element closest to the mean. *V* can be randomly generated within the code. Do not use the `sum`, `mean` and `find` built-in functions in MATLAB.

*Example:* if  $V = [3, 5, 4, 2, 6, 1, 1]$ , then the mean is  $22/7=3.14286$  and the index of the element closest to the mean is 1.

### **Exercise 6-10)**

Solve the above exercises (1-5) for a matrix *A* (rather than vector *V*). You do not need to write the flow chart.