

BIL 112E Project

Please read the following instructions very carefully before proceeding to the question.

- You **must** use Fortran 90/95/F.
- Name your file as your **İTÜ e-mail username** (e.g. birkandant.f95) and **upload your Fortran file (not a PDF or other types)** as your project.
- You **must** upload your project **as a Fortran file** (with an **.f, .f90 or .f95 extension**) to Ninova **before** the deadline.
- Uploading the **correct** file to Ninova **before** the deadline is **your** responsibility. Belated projects without a documented excuse will **not** be graded.
- Do **not** write additional features to the program, just follow the question.
- Do **not** use commands, variable types, or methods we did not cover in class examples. For example:
 - You cannot use “allocatable arrays” anywhere in the code.
 - You cannot use the command “goto” anywhere in the code.
 - You cannot use the statement “select case/case” anywhere in the code.
 - You cannot use “logical variables” anywhere in the code.
 - You cannot use “subprograms (subroutines, functions)” and “modules” in your code.
- The first line of your program should be a **comment** line including your student number and full name. (e.g. ! 090909090 Tolga Birkandan)
- You will see **XX** at the end of some variable names. You should **replace** them with your **initials** in capitals using the English alphabet. If you have three names use all initials. (e.g. for “Tolga Birkandan”, “fXX” will be “fTB”, for “Hüseyin Şevki Topuz”, “fXX” will be “fHST”)
- Use comment lines to explain:
 - o Each **variable** when you declare them (e.g. ! The variable g stores the value of the gravitational acceleration in m/s**2)
 - o Each **loop** (e. g. ! This loop calculates the sum of the elements in vector v1)
 - o Each **if** condition (e.g. ! If the value of i equals to N we exit the loop)
 - o At the beginning of the main program, after your student number and name, **summarize the whole question** in your own words using comment lines.

You can use your notes and any online/offline documents but you are not allowed to communicate with another human being online / offline / directly / indirectly.

Please **double check** your program to make sure that you followed **all** the instructions before uploading it to Ninova.

QUESTION

- Declare NrowXX as an integer parameter (constant) such that **NrowXX is (the last digit of your student number + 1)*19**
- Declare NcolXX as an integer parameter (constant) such that **NcolXX is (the last digit of your student number + 1)*23**
- Declare the (NrowXX by NcolXX) real matrices matXX and avematXX.
- Declare the real number averageXX.
- You are free to declare more variables (i, j, etc.) if you need.
- Fill the matrix matXX such that the ith row and jth column element will be the result of the sum:

$$\text{matXX}(i,j) = \sum_{kXX=0}^{i+j} \frac{8.0}{(4 * kXX + 1) * (4 * kXX + 3)}$$

- Calculate avematXX such that the ith row and jth column element of avematXX will be the average of the ith row and jth column element of matXX and its nearest neighbors.

For example,

Then, $\text{avematXX}(3,3) = (14+15+36+71+55)/5.0$

or

Then, $\text{avematXX}(2,5) = (11+27+19+26)/4.0$

or

Then, $\text{avematXX}(1,1) = (12+7+45)/3.0$

- Calculate the average of the whole elements of the matrix avematXX and set it to averageXX.
- Display the value of averageXX on the screen. (Your result will be a real number.)

HINT:

The nearest neighbors of the element $M(i,j)$ of a matrix M are given below in terms of the row and column numbers:

