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## Semestral Project user documentation

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The program is constructed to help compute different operations with matrices (such as addition, multiplication, finding inverse, and determinant).

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### Getting started

The program is written in c# language.

To run the program it will need to install .NET 7.0 framework and IDE.

### Welcoming window



```
mariia — Matrix-proj — 75x20
Last login: Fri Sep 15 10:50:43 on ttys000
mariia@MacBook-Air-Mariia ~ % /Users/mariia/RiderProjects/Solution/Matrix-p
roj/bin/Debug/net7.0/Matrix-proj

Type the command which you want to execute(add - for matrix addition, mult
- for matrix multiplication, inverse - for matrix inverse, det - for matrix
determinant, exit - to terminate the programm):
█
```

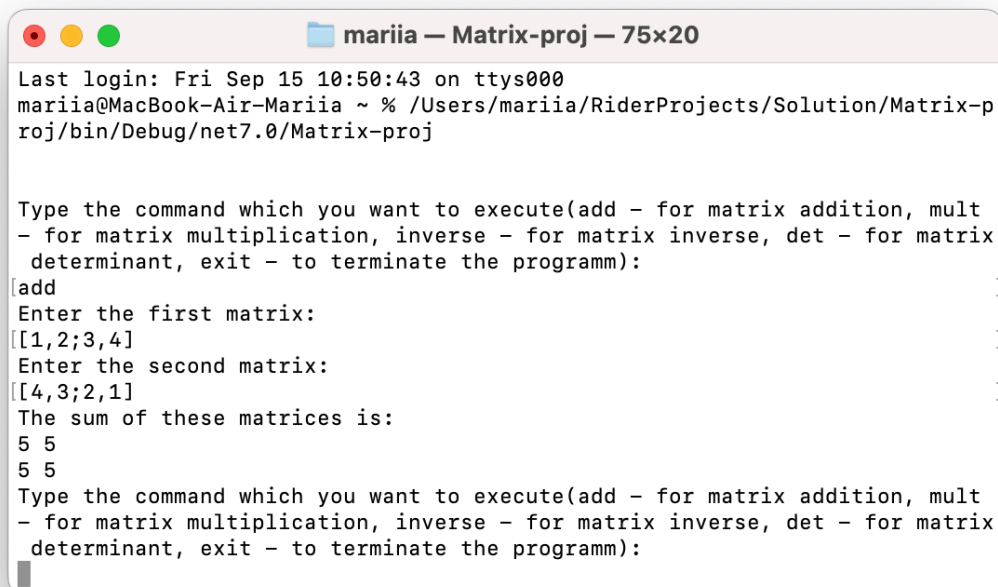
First, it is necessary to type the command which you want to execute. At this step, one should choose from five existing options and type (without quotes):

- «add» — for adding two matrices together
- «mult» — for multiplying the first matrix with the second one
- «inversre» — to compute the inverse of the matrix
- «det» — to compute the determinant of the matrix
- «exit» — to terminate the program

## Section: Matrix addition

After choosing the «add» option and pressing *Enter*, one can start to insert both matrices one by one using the Matlab notation (i.e. [a,b,c;d,e,f] — matrix of two rows and three columns with entries a-f).

The program will give the answer and go back to the starting window.



```
mariia — Matrix-proj — 75x20
Last login: Fri Sep 15 10:50:43 on ttys000
mariia@MacBook-Air-Mariia ~ % /Users/mariia/RiderProjects/Solution/Matrix-p
roj/bin/Debug/net7.0/Matrix-proj

Type the command which you want to execute(add - for matrix addition, mult
- for matrix multiplication, inverse - for matrix inverse, det - for matrix
determinant, exit - to terminate the programm):
[add]
Enter the first matrix:
[[1,2;3,4]
Enter the second matrix:
[[4,3;2,1]
The sum of these matrices is:
5 5
5 5
Type the command which you want to execute(add - for matrix addition, mult
- for matrix multiplication, inverse - for matrix inverse, det - for matrix
determinant, exit - to terminate the programm):
```

*example of an operation result*

If it is been a mistake in inserting data, one will receive a hint  
«Incorrect input. Try again!»

*example of incorrect input below*



```
mariia — Matrix-proj — 75x20

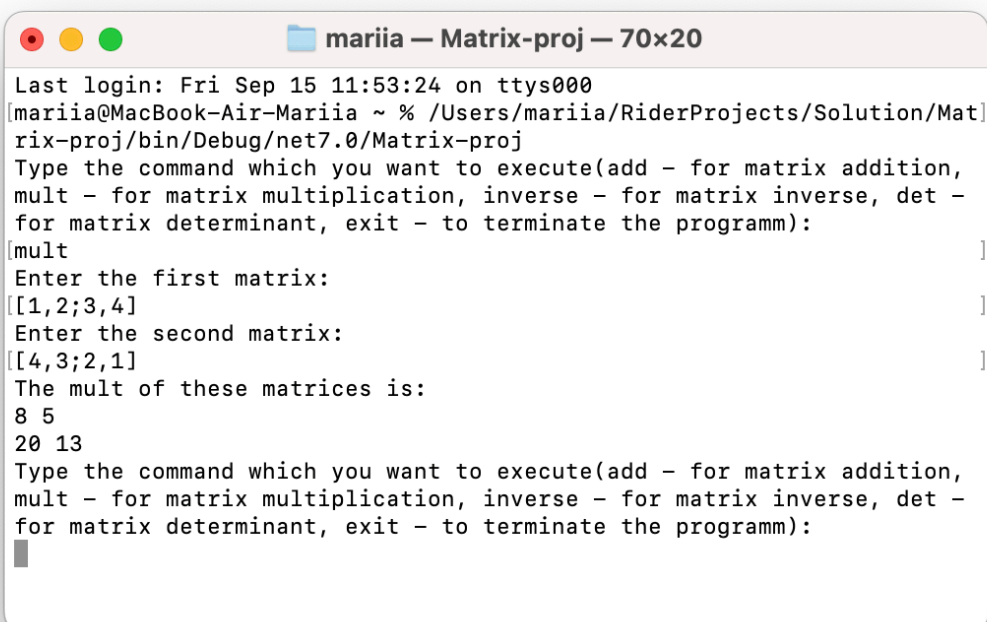
Type the command which you want to execute(add - for matrix addition, mult
- for matrix multiplication, inverse - for matrix inverse, det - for matrix
determinant, exit - to terminate the programm):
[add
Enter the first matrix:
[[1,2;3,4]
Enter the second matrix:
[[4,3;2,1]
The sum of these matrices is:
5 5
5 5
Type the command which you want to execute(add - for matrix addition, mult
- for matrix multiplication, inverse - for matrix inverse, det - for matrix
determinant, exit - to terminate the programm):
[add
Enter the first matrix:
[w,r,o,n,g
Incorrect input. Try again!
```

## Section: Matrix multiplication

After choosing the «mult» option and pressing *Enter*, one can start to insert both matrices one by one using the Matlab notation (i.e.  $[a,b,c;d,e,f]$  — matrix of two rows and three columns with entries a-f).

The program will give the answer and go back to the starting window.

*example of an operation result*



```
mariia — Matrix-proj — 70x20

Last login: Fri Sep 15 11:53:24 on ttys000
[mariia@MacBook-Air-Mariia ~ % /Users/mariia/RiderProjects/Solution/Matrix-proj/bin/Debug/net7.0/Matrix-proj
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[mult
Enter the first matrix:
[[1,2;3,4]
Enter the second matrix:
[[4,3;2,1]
The mult of these matrices is:
8 5
20 13
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[w,r,o,n,g
Incorrect input. Try again!
```

If it is been a mistake in inserting data, one will receive a hint  
«Incorrect input. Try again!»

### **FUN FACT:**

*It is only possible to multiply matrices with a proper size (the number of rows in the first matrix corresponds to the number of columns in the second one)*

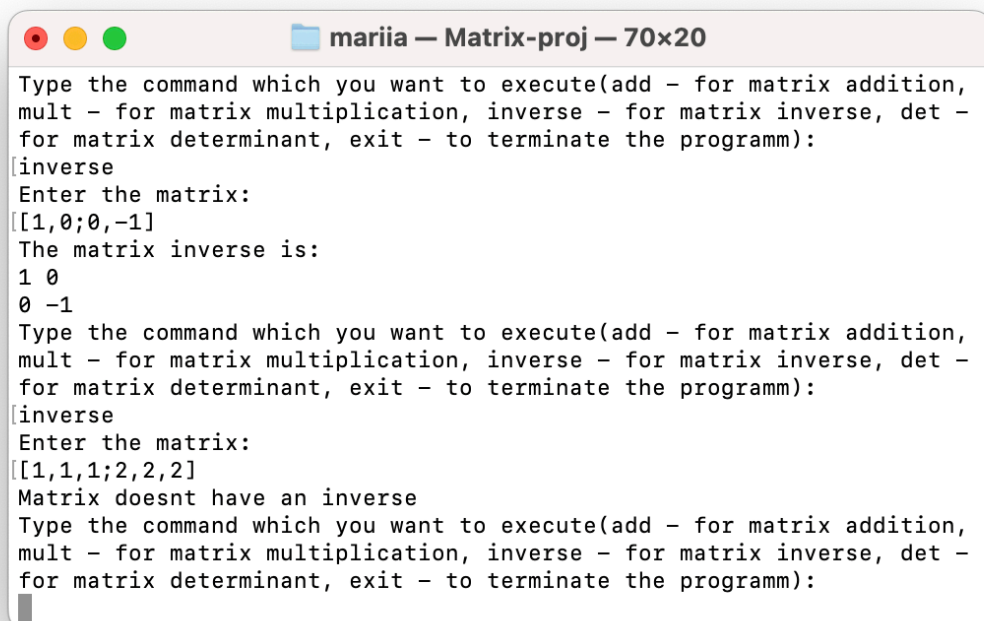
## **Section: Matrix inverse**

After choosing the «inverse» option and pressing *Enter*, one can start to insert the matrix using the Matlab notation (i.e. [a,b,c;d,e,f] — matrix of two rows and three columns with entries a-f).

The program will give the answer and go back to the starting window.

If it is been a mistake in inserting data, one will receive a hint  
«Incorrect input. Try again!»

*example of an operation result*



```
mariia — Matrix-proj — 70x20
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[inverse
Enter the matrix:
[[1,0;0,-1]
The matrix inverse is:
1 0
0 -1
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[inverse
Enter the matrix:
[[1,1,1;2,2,2]
Matrix doesnt have an inverse
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
```

### **FUN FACT:**

*Not all matrices are invertible. It is only applied to the square matrices with  $n$  pivot columns.*

## Section: Determinant of the matrix

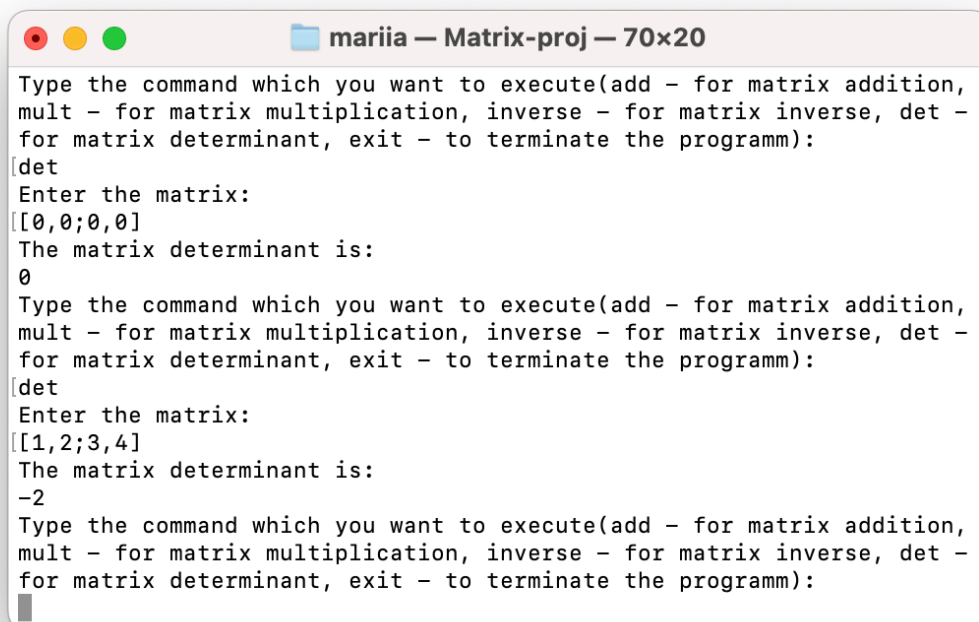
After choosing the «det» option and pressing *Enter*, one can start to insert the matrix using the Matlab notation (i.e. [a,b,c;d,e,f] — matrix of two rows and three columns with entries a-f).

The program will give the answer and go back to the starting window.

If it is been a mistake in inserting data, one will receive a hint

«Incorrect input. Try again!» Or «The determinant can't be calculated. Try again!»

*example of an operation result*



```
mariia — Matrix-proj — 70x20
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[det
Enter the matrix:
[[0,0;0,0]
The matrix determinant is:
0
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
[det
Enter the matrix:
[[1,2;3,4]
The matrix determinant is:
-2
Type the command which you want to execute(add - for matrix addition,
mult - for matrix multiplication, inverse - for matrix inverse, det -
for matrix determinant, exit - to terminate the programm):
```

### **FUN FACT:**

*Not all matrices have a determinant. It is only applied to the square matrices.*