TNSL20 - Practice Exam

This is a practice exam for MATLAB part of the TNSL20 course.

You are allowed to use:

- All lab material

- Previously written code

- Internet

Not allowed:

- Communication of any kind (email, chat, discussion, phones or other mobile devices, etc.)

- Information from your neighbour's display

The exam goes during the whole class without the break. Late submissions will not be graded.
All mobile devices should be off and away.
To pass the course you need to correctly solve at least 2 tasks.
Please, submit all your MATLAB codes (.m files) to your teacher in a single email.

Good luck!

1 Task 1

Create a program that for a given vector `v` creates a new vector `a` with elements of `v` which are greater than 10 and less than 20. Make sure that your code works with any `v`.

For example, for the following vector `v`:

```
v = [1, 15, 7, 26, 13, 78, 19];
```

The resulting vector `a` should be `[15, 13, 19]`.

2 Task 2

Create a program that for a given vector `v` prints all pairs of elements from this vector where the first number is less or equal to the second number. Make sure that your program works with any `v`.

For example, for the vector `v = [1, 7, 5, 3]` the program output should be (order does not matter)

```
1    1
1    7
1    5
1    3
7    7
5    7
5    5
3    7
3    5
3    3
```

3 Task 3

Write a program that for given two numbers m and n constructs an $m \times n$ matrix, where for any row i and column j the element at i-th row and j-th column has the value of $i - j$. Try your code by creating a 5×9 matrix. Make sure that your code works with any m and n.

For example, for the input values `m = 4;` and `n = 3;` the resulting 4×3 matrix should be

$$\begin{bmatrix} (1-1) & (1-2) & (1-3) \\ (2-1) & (2-2) & (2-3) \\ (3-1) & (3-2) & (3-3) \\ (4-1) & (4-2) & (4-3) \end{bmatrix} = \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -1 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix} \tag{1}$$

4 Task 4

Create a program that prints matrix row by row, separating matrix rows with a line of symbols "&". Make sure that your program works with any matrix.

For example, for the input matrix

```
1  A = [
2       10,  20;
3       30,  10;
4       50,  60;
5       52,  19;
6       65,  12;
7       74,  234;
8       53,  23
9  ];
```

The program output should be

```
1   10  20
2   &&&&&&&&&&&&&&&&&&&&
3   30  10
4   &&&&&&&&&&&&&&&&&&&&
5   50  60
6   &&&&&&&&&&&&&&&&&&&&
7   52  19
8   &&&&&&&&&&&&&&&&&&&&
9   65  12
10  &&&&&&&&&&&&&&&&&&&&
11  74  234
12  &&&&&&&&&&&&&&&&&&&&
13  53  23
```

5   Task 5

Write a program that creates a 4×4 matrix with random numbers and computes the sum of all matrix elements.