

1)

What is the output of the following program?

```
t = [ 2:3:10  [7 5 3]]
B = diag(t) - diag(t(1:end-1),1);
B([1 3 6], [4:5 1])
```

2)

Write a Matlab function `Mpot` that takes a matrix M as input, and as output returns a matrix P of the same size as M ; the entries p_{ij} of P are defined in terms of the entries m_{ij} of M as follows:

$$p_{ij} = \frac{m_{ij}^2}{ij}.$$

3)

Write a recursive Matlab function `H` that takes as input an integer $n \geq 0$, and returns as output the matrix H_n defined on the right. `while` and `for` loops are not allowed.

$$H_n = \begin{bmatrix} n & n & n & \dots & n & n \\ n & n-1 & n-1 & \dots & n-1 & n-1 \\ n & n-1 & n-2 & \dots & n-2 & n-2 \\ \vdots & \vdots & \vdots & \ddots & & \vdots \\ n & n-1 & n-2 & & 1 & 1 \\ n & n-1 & n-2 & \dots & 1 & 0 \end{bmatrix}$$

4)

M =

1	5	9	13	17
2	6	10	14	18
3	7	11	15	19
4	8	12	16	20

M(???) = M (???)

M =

1	5	9	13	17
20	16	12	8	4
3	7	11	15	19
18	14	10	6	2

What is the assignment that transforms the matrix M as shown?

5)

The following expressions are evaluated in Matlab. What is the result?

a) [1 point] `sqrt(sqrt(sqrt(sqrt((((2^2)^2)^2)^2))))`

b) [1 point] `sqrt(sqrt(sqrt(sqrt(2^(2^(2^(2^2)))))))`

c) [1 point] `[pi, [pi, pi], pi] * [1 -1 1 -1]'`