

Università del Piemonte Orientale - DISEI
Business Intelligence for Finance (EC0149)

The following exercises are intended only as examples and do not constitute an exhaustive list of all the possible types of exam exercises.

Exercise 1. (COMPULSORY) Create the Matlab script file **Exercise1**. Then, in the file solve the following.

- (a) Let $n = 5$. Compute the sum $s = \sum_{i=1}^n \frac{(-1)^i}{i^2 + 1}$: 1) with a **while** loop, 2) with a **for** loop, 3) with matrix operations.
Check that the three codes give exactly the same result.
- (b) Consider the matrix $A = [2, 3, 4; 5, 6, 7; 8, 9, 10]$. By using suitable Matlab commands, extract the submatrix B composed of the elements $[a_{12}, a_{13}; a_{22}, a_{23}]$.
- (c) Extract the diagonal d of the matrix B .
- (d) Use the suitable Matlab commands to transform the principal diagonal of A in such a way that it contains only zeros.

Exercise 2. (a) Create the Matlab function **funEx2** which takes a vector x as an input and evaluates the following function:

$$y = f(x) = \begin{cases} 4 \cdot e^{x+2} & \text{if } x \leq -2 \\ 2 \cdot (x^2 - 2) & \text{if } -2 < x \leq 2 \\ 4 \cdot e^{-x+2} & \text{if } x > 2 \end{cases}$$

by a **for** loop.

- (b) Create the Matlab script file **Exercise2**. In the file **Exercise2** plot the graphic of the function defined in **funEx2** on the interval $[-3, 4]$, with a step of 0.1.
- (c) In the file **Exercise2**, define the same function as before by using **@** and the logical operators (without a for loop) and overlap the graphs of the two functions to verify that they are identical, by using different colors and markers. Save the graph with the name **figureEx2**.

Exercise 3. Create the Matlab script file **Exercise3**. Write the Italian amortization schedule of a mortgage of 250.000 euros with annual payments and 5 years maturity. Assume an annual discount rate of 1% for the first year and of 2% for the remaining 4 years. Save the schedule in an excel file named **Exer3.xlsx**.