University of Macerata
Mathematical Methods for Economics and Finance

Exam Simulation B

May 03, 2023

1. In Matlab:

    (a) define the array $\mathbf{x}$ consisting of the first 10 multiple of 3 (starting from 3)

    (b) reverse the array $\mathbf{x}$

    (c) select from $\mathbf{x}$ the elements in position 3, 6, and 9 and redefine the array $\mathbf{x}$ with these elements

    (d) define the array $\mathbf{y}$ consisting of the numbers 1, 2, and 3

    (e) define the array $\mathbf{z}$ where each element is equal to 1 and having the same size of the array $\mathbf{y}$

    (f) define the matrix $\mathbf{A}$ having as columns the vectors $\mathbf{x}$, $\mathbf{y}$, and $\mathbf{z}$

    (g) define the matrix $\mathbf{B}$ equal to the transpose of the matrix $\mathbf{A}$

    (h) is it possible to compute $\mathbf{A} + \mathbf{B}$? If so, what is the result?

    (i) create the matrix $\mathbf{C}$ deleting from the matrix $\mathbf{A}$ the first column and the first row

    (j) consider the functions $f(x) = x \sin x$ and $g(x) = \frac{e^x}{x^2+1}$: make the plot in the same figure of the two functions in the interval $[-4, 4]$ and then compute $f(\mathbf{C})$ and $g(\mathbf{C})$.

2. Find the level curves for the following function: $z = x^2 - y^2$. Make a 2x1 subplot with the function in subplot 1 and the level curves in subplot 2.

3. Write the second-degree Taylor polynomial for the following function at the given point: $f(x, y) = (x + y^2) \sin(x - y)$, $\quad \mathbf{x}_0 = (0, 0)$. Make a plot with the function and the Taylor polynomial.