Variant 2

Task 1 (paper+Python) (30 points)

1. (paper) Find the first 3 nonzero terms of the Taylor Series for the given function

$$f(x) = \cos\left(\frac{x^{\frac{2}{3}}}{\sqrt{2}}\right) \quad for \; a = 0$$

2. (paper) Calculate the Remainder R_3 for $x = 1$.
3. (paper) Write the series using summation notation
4. (paper) Determine the Range of Convergence of the series
5. (Python) Draw the original function and its 5 nonzero terms in one graphical window, using the same interval for x values. Add gridlines, title, axes titles, legend on the graph.
6. (Python) For each value of x (range for x is the same as for graph) print on the screen numerical value of original function, Taylor series approximation after adding 5 terms, absolute error value.
7. Upload Python file to LMS with name: **Name_surname_21.py**

Task 2 (Python) (40 points)

1. At first graphically represent the function $cos(x) - x \cdot e^x = 0$ and determine root located interval for Bisection method and initial guess/guesses of the root for Newton-Raphson and Secant method.
2. Use Bisection, Newton-Raphson and Secant methods and find a root of equation with error level 10^{-8}. All methods should be realized using def-functions.
3. Print roots on the screen. Check the results for all methods.
4. Estimate number of iterations for all methods.
5. Plot function and defined roots on the same graph. Add gridlines, legend, title on the graph.
6. Upload file to LMS with the name: **Name_surname_22.py**

Task 3 (Paper) (30 points)

1. Solve the following system manually using Gauss Elimination method
2. Check your results by substituting your roots into equations.

$$\begin{cases} 2a + 5b + 4c + d = 20 \\ a + 3b + 2c + d = 11 \\ 2a + 10b + 9c + 7d = 40 \\ 3a + 8b + 9c + 2d = 37 \end{cases}$$