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Approximate the given set of values  $\{\mathbf{x}, \mathbf{y}\} = \{x_i, y_i\}_{i=1}^N$  by a chosen function. The proposed data set can be changed. The solution includes:

- the creation of the system of equations for evaluation of desired constants of the approximation function (by the least square method)
  - the compilation of MATLAB program for evaluation of desired constants
  - the graphical illustration of the error surface using the "mesh" and "contour" plots
  - the creation of the algorithm of the gradient method to solve the same problem
  - the compilation of MATLAB program for evaluation of desired constants by the gradient method with the visualization in the "contour" plot
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M1  $f(x) = c_1 + c_2 x$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.3 \ 0.4 \ 0.6 \ 0.9]'$ ,  $[0.9 \ 1.4 \ 1.7 \ 1.6 \ 2.1]'$

M2  $f(x) = c_1 + c_2 x^2$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.3 \ 0.4 \ 0.6 \ 0.9]'$ ,  $[1 \ 1.4 \ 1 \ 1.4 \ 2.8]'$

M3  $f(x) = c_1 + c_2 x^3$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.3 \ 0.4 \ 0.6 \ 0.9]'$ ,  $[0.9 \ 1.2 \ 0.8 \ 0.9 \ 2.2]'$

M4  $f(x) = c_1 x + c_2 x^2$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.4 \ 0.9 \ 1.6 \ 1.8]'$ ,  $[0.4 \ 0.4 \ 1.1 \ 3.7 \ 4.5]'$

M5  $f(x) = c_1 + c_2/x$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.4 \ 0.9 \ 1.6 \ 1.8]'$ ,  $[10.4 \ 3.6 \ 2.2 \ 1.6 \ 0.4]'$

M6  $f(x) = c_1 + c_2 e^{-x}$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.4 \ 0.9 \ 1.6 \ 1.8]'$ ,  $[2.7 \ 2.5 \ 1.8 \ 1.6 \ 1.5]'$

M7  $f(x) = c_1 e^{-0.5x} + c_2 e^{-2x}$

The proposed data set:  $\mathbf{x}, \mathbf{y} = [0.1 \ 0.4 \ 0.9 \ 1.6 \ 1.8]'$ ,  $[2.4 \ 1.9 \ 0.8 \ 0.2 \ 0.6]'$

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The description of the project should include

1. Project title, name of the author, affiliation, date of submission
2. Introduction (applications of data processing)
3. Methodology (mathematical description of the least square method and algorithms based on (i) the solution of system of equations and (ii) the gradient method)
4. Results (program and results in graphical and tabular forms)
5. Discussion and Conclusion
6. References (cited in Section I Introduction)

The project should be submitted as a single PDF file.

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