

Interpolacija in aproksimacija

9. VAJA

9.1 Interpolacija

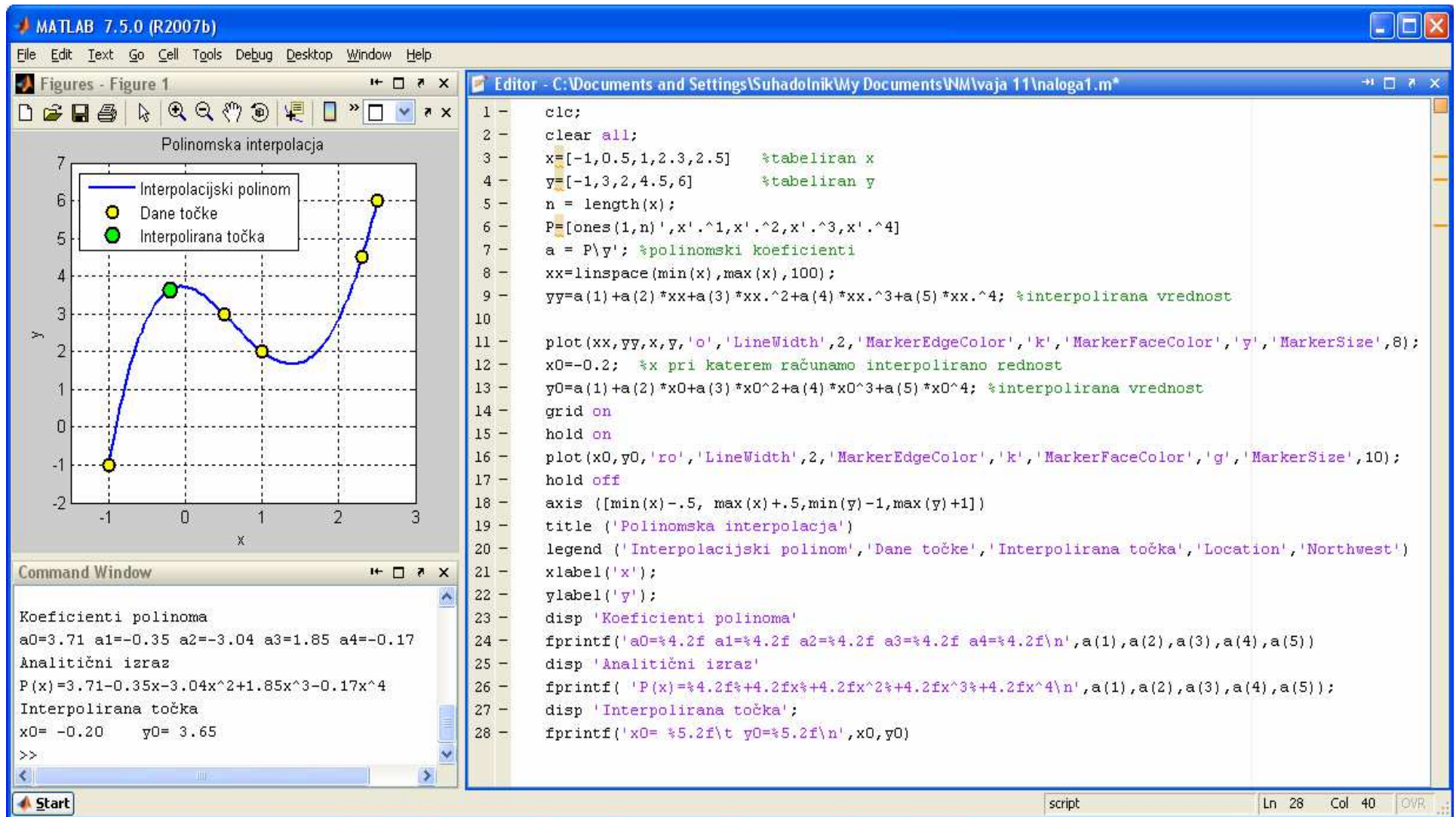
Izvedite polinomsko interpolacijo za dano tabelo:

x	y
-1	-1
0.5	3
1	2
2.3	4.5
2.5	6

$$P_{n-1}(x) = a_0 + a_1x + a_2x^2 + a_3x^3 + a_4x^4$$

- določite koeficiente interpolacijskega polinoma
- narišite polinom in napišite njegov analitični izraz
- izračunajte $y(-0.2)$

9.1 Interpolacija



9.2 Aproksimacija

Tabelo ponazorite na sledeče načine:

-interpolacija (*polyfit*)

-nelinearna aproksimacija s funkcijo

$$f(x, a_1, a_2, a_3, a_4, a_5) = a_1 + a_2x + a_3x^2 + a_4e^{a_5x^2}$$

začetni približki so: $a_1 = 0.7, a_2 = 0.16, a_3 = -0.03, a_4 = 0.08, a_5 = 0.54$

(*lsqcurvefit*)

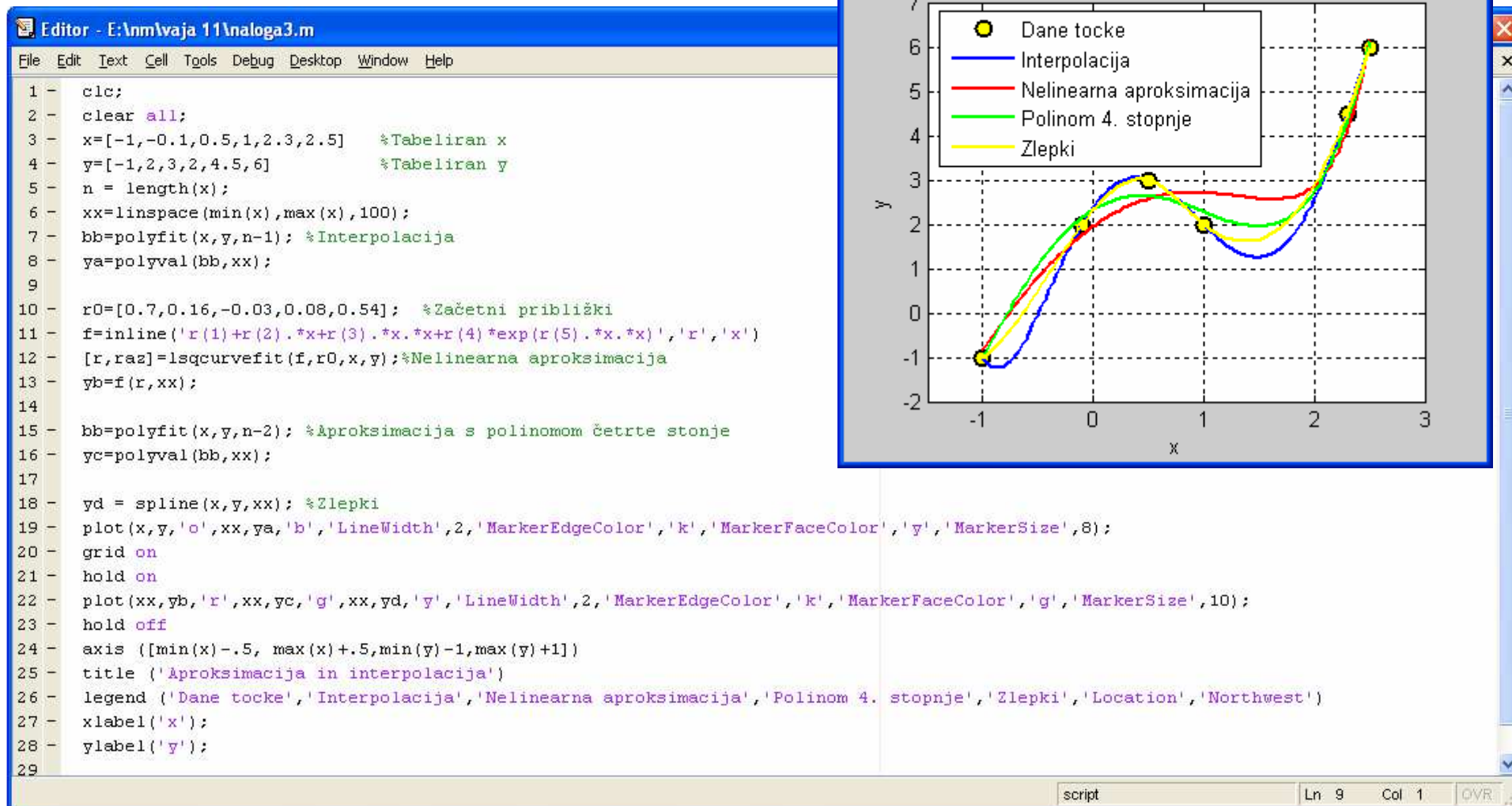
-aproksimacija s polinomom 4 stopnje (*polyfit*)

-aproksimacija z zlepkami (*spline*)

Tabela

x	y
-1	-1
-0.1	2
0.5	3
1	2
2.3	4.5
2.5	6

9.2 Aproksimacija

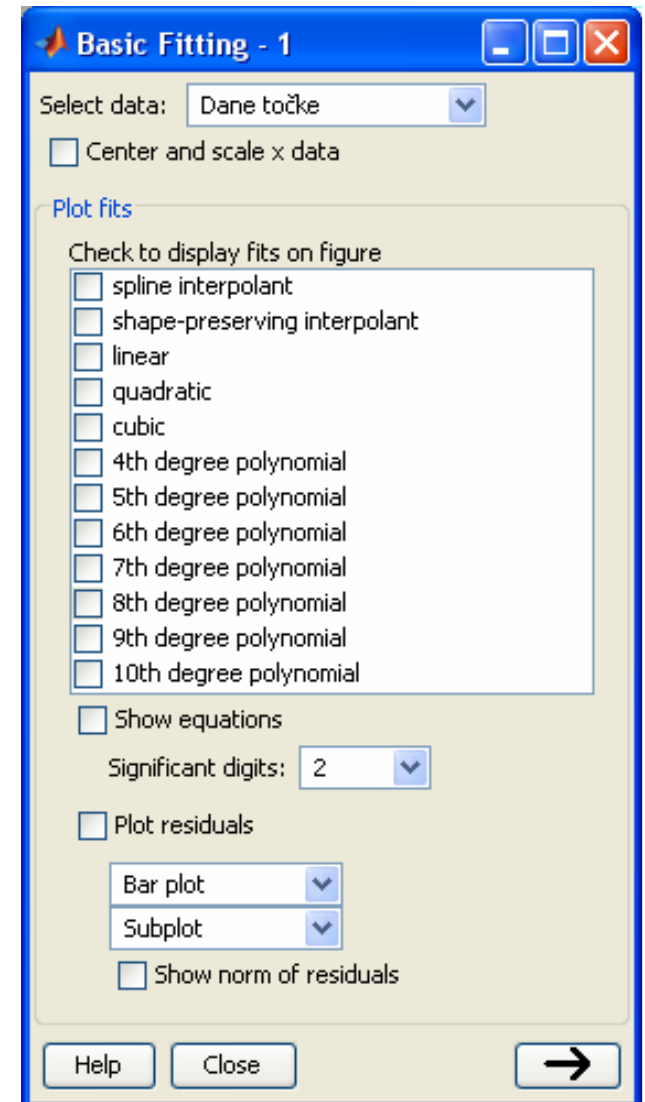


9.3 Matlabova grafična orodja

Sami napišite program, ki nariše šest poljubno izbranih točk. Točke nato aproksimirajte in interpolirajte s pomočjo Matlabovega orodja v sliki (Tools->Basic Fitting)

Tabela

x	y
-1	-1
-0.1	2
0.5	3
1	2
2.3	4.5
2.5	6



9.4 Inverzna interpolacija

Izračunaj ničlo tabelirane funkcije.

x	y
-1	-1
-0.8	-0.1
-0.5	1
0.1	2
0.5	3
1	4

9.4 Inverzna interpolacija

The image displays the MATLAB 7.6.0 (R2008a) environment. The main window is divided into three panes: a script editor, a command window, and two figure windows.

Script Editor: The script `inverzna.m` performs the following steps:
1. Clears the workspace and command window.
2. Defines data points: `x = [-1, -0.8, -0.5, 0.1, 0.5, 1];` and `y = [-1, -1, 1, 2, 3, 4];`
3. Generates a dense grid of points: `xx = linspace(x(1), x(length(x)), 100);` and `yy = linspace(y(1), y(length(y)), 100);`
4. Fits a polynomial to the data: `bb = polyfit(x, y, length(x)-1);`
5. Evaluates the polynomial at the grid points: `yc = polyval(bb, xx);`
6. Performs inverse interpolation: `b0 = polyfit(y, x, length(x)-1);`
7. Evaluates the inverse polynomial at `y=0`: `x0 = polyval(b0, 0);`
8. Plots the data points and the polynomial fit in Figure 1.
9. Plots the data points and the inverse polynomial fit in Figure 2.
10. Prints the result: `fprintf('Nišla tabelirane funkcije je x0=%5.3f, y0=0\n', x0);`

Figure 1: Inverzna interpolacija
This plot shows the original data points (blue circles) and the polynomial fit (green line). A red circle marks the calculated point at $y=0$. The x-axis ranges from -1 to 4, and the y-axis ranges from -1.5 to 1.5.

Figure 2: Interpolacija
This plot shows the original data points (blue circles) and the inverse polynomial fit (green line). A red circle marks the calculated point at $x=0$. The x-axis ranges from -1 to 1, and the y-axis ranges from -2 to 6.

Command Window: The output of the script is: `Nišla tabelirane funkcije je x0=-0.794, y0=0`