

Introduction to Programming 2017-2018

Exercise 6

Question 1

- a. A sigmoid function can be described by the formula: $y = \frac{a}{1 + e^{-bx}}$. Write a function **'sigmaFunc'** that gets three input arguments: a data vector, value for the 'a' coefficient, value for the 'b' coefficient (in this order), and returns one output argument which is a vector of y values after applying the sigmoid formula on the data vector (using the specified 'a' and 'b' values).
- b. Write a function called **'sigmaPlot'** with no input and no output arguments, which calculates 4 sigmoid functions with different coefficients and plots them on the same graph. The functions should be calculated by calling *sigmaFunc* using the vector [-20: 0.05 :20] as data vector and the appropriate coefficients.

The following coefficients should be used:

- a= 1, b= 1. The function should be plotted in blue solid line.
- a= 3, b= 0.5. The function should be plotted in red dotted line.
- a= 1.5, b= 0.3. The function should be plotted in green dashed line.
- a= 2, b= 3. The function should be plotted in black dash-dot line

Add appropriate title, axes labels and legend to your figure.

- c. Write a function called **sigmaPlotB** with no input and no output arguments, which does the following:
- Calculates 3 sigmoid functions with the same coefficients (a=4, b=0.5) but different x-data:
 - i. x = [-50 : 0.5 : 50].
 - ii. x = [-50 : 5 : 50].
 - iii. x = [-50 : 10 : 50].

The sigmoid functions should be calculated by calling the *sigmaFunc* function from section a.

- Create a **new figure** with 3 subplots, ordered in one column, and plot the three sigmoids, one on each subplot (in the same order they appear above), as a function of their respective x-data. Make all plots in solid black lines.

- For each subplot, add the relevant x-axis label, y-axis label, and title. The title for each graph should include the increment of the x-data with which the sigmoid was calculated. Change the Y-axis limits (of each subplot) to be from 0 to 6.

Notes for question 1:

- Do **not** use handles of the graphical objects in this question (and do **not** use the 'get' and 'set' commands) - use only the direct graphical commands such as xlim, ylabel, title, etc.
- Exponentials in Matlab can be calculated by the 'exp' command. For example, the Matlab expression $\exp(x)$ calculates the mathematical expression e^x .

Question 2

The attached function '**ex6Handles**' creates a figure with graphs and returns one output argument, the handle to the text object in the graph. The function gets no input arguments.

In this question you are required to call the **ex6Handles** function, get its returned handle, and change the appearance of the generated graph by navigating the handles hierarchy based on the returned handle.

Write a function called '**navHandles**'. The function should receive no input arguments and return no output arguments.

Inside the function, call the function '**ex6Handles**' and get its returned value, i.e., the handle to the text object. Use this handle to get handles to other objects in the graph and use them to change the following properties:

Figure properties:

- Name: 'my figure'.
- Color (background color): [0.2 0.5 0.5] (RGB).

Subplot 1 (top) properties:

Axes properties:

- Y-axis limits: from -1 to 2.
- Ticks of the x-axis (change the ticks without changing the limit): from 0 to 100 with intervals of 20.
- Labels to the x and y axes: 'x data' and 'sine values', respectively.
 - Font size (of the labels): 15
- Title: 'sine function'.
 - Font size (of the title): 15
 - Color: red

Line properties:

- Color: green
- Line style: dashed
- Line width: 2
- Marker: diamond
- Marker size: 10

Subplot 2 (bottom) properties:

Axes properties:

- Color (background color): [1 0.1 0.4] (RGB).
- Font size: 16.
- Axis line color (xColor, yColor): yellow.
- Title: 'cosine function'.

Line properties:

- Color: black
- Line width: 3.

Text object properties:

- Color: blue
- Font size: 20

Notes for question 2:

- Do not use the 'gca' or 'gcf' functions. Get all your required handles by using the 'parent' and 'children' properties of other objects.
- Do not use direct MATLAB graphics functions such as xlim, ylabel, title, etc. Use only the graphic **handles** to change the **properties** (by the 'get' and 'set' commands).
- Do not change the XData or YData of the plots.

General notes:

1. There is **no need** to print and submit the figures on hard-copy, and no need to submit them with the soft-copy.
2. Do not use the 'close' or 'close all' commands in your functions (since it will interfere with the checking process of the exercise).
3. Submission date: Soft copy should be submitted by **Monday (25.12.15) / Wednesday (27.12.15) 24:00**. Hard copy should be submitted at the beginning of your Targul group.

Good luck!