Assignment 6

Read the assignment carefully! Remember that the first line of a script must be the call to the script preamble.

A. Mandatory

The script Assignment06A.m calls the local function find_match which you have to complete according to the specifications in the comment. **Please read them carefully! No hard-coding!**

```
function result=find_match(key,struct,field)
% input arguments: ****************************************
% key: search string (character array or string)
% struct: structure array
% field: name of the field of struct that is to be searched,
%        (char array or string);
%        if empty or missing: all fields of struct are searched;
%        if field does not match a field name of struct,
%        print out a warning and return an empty result;
%        the matching is case insensitive.
%
% ******************************************************
% if any input argument is not of the correct type,     *
% return an empty result and print an error message <<  *
% ******************************************************
%
% output argument: ************************************
% result: vector of indices of the elements of struct
%         where a match is found
% Example: result=find_match('01',struct,'myfield') returns the
%          indices of all elements of struct where the string '01'
%          is found in field 'myfield'
% Example: result=find_match('Ab',struct) returns the indices of
%          all elements of struct where any of the strings 'AB',
%          'Ab', 'aB', 'ab' is found in any field
```

Useful functions: nargin, fieldnames, strcmp, getfield, lower, contains *(4 pt)*

Before submission: Test the script and check the results. **Rename the completed script to Assignment06A_IDxx.m**[1].

Continued on page 2!

[1] xx is your/your group's ID number for the submission.

B. Optional

Write the script **Assignment06B_IDxx.m**[2] that uses symbolic operations to find the stationary points of the symbolic function

$$f(x, y) = x^4 - x^2 - y^3 + y^2 + 1, \quad x, y \in \mathbb{R}.$$

Use the Hesse matrix of the function to determine the type of the stationary points. Convert the symbolic function to a function handle and compute its values in the rectangle $[-1, 1] \times [-0.6, 1.4]$ on a grid of dimension 101×101. Generate a figure window with the surface plot and a color bar, and a second figure window with the contour plot and a color bar. The contour plot should have the same scale on the x and y axes and display 21 contour lines, with heights equally spaced between the minimal and the maximal function value in the range of x and y. If there are saddle points, the contour lines that pass through them should be shown as well. Mark each stationary point in the contour plot and add a text indicating the type (max/min/sp). As usual, add axis labels and a title to both plots. *(4 pt)*

➽ **Make sure that the relevant results and *only* those are shown in the output to the command window. Submit the script(s) until 5pm on May 5, 2021. Don't forget to put your partner in cc! Any violation of the naming convention will lead to the rejection of the submission.**

[2] xx is your/your group's ID number for the submission.