Handling a function in Matlab

1. Defining functions

   - Anonymous function: `funcName = @(inVar) funcExprs`
   - Inline function : `funcName = inline(funcExprs, inVar1, inVar2, ...)`
   - Using `function`: `function outVar = funcName(inVar1, inVar2, ...){ funcExprs }`

Graphs of functions

1. Plotting single variable functions: `plot`

   - Decorating options: color and marking, `linewidth`, `markersize`
   - Multiple drawing: `hold on`, `hold off`, `drawnow`

2. Plotting 2-variable functions: `surf`, `mesh`

   - How to use `meshgrid`
   - Predefined grid for sphere: `sphere`

3. Drawing implicit graphs

   - Implicit plots in 2d and 3d: `implicit`, `implicit3`
   - Plotting contour lines: `contour`, `contour3`

4. Adding legends

   - Titles, x and y-labels: `title`, `xlabel`, `ylabel`
   - Adding texts: `text`
   - Adding legends: `legend`

Scatter plot and regression (only if time pemits)

1. Drawing scatter plot: `scatter`

2. Finding regression line: `regress` (Need *Statistics and Machine Learning Toolbox*)

3. Drawing histogram: `histogram`

Exercise

1. Define the following function in three different ways: `f(x,y) = x^2+y^2`

2. Plot the graph of single variable function: `f(x) = x^2 - x + 1`

3. Plot the graph of 2-variable function: `f(x,y) = x^2 - y^2` over $[-1,1] \times [-1,1]$

4. Plot the graph of implicit equation: `x^2 + 2y^2 = 1`

5. Plot the graph of implicit equation: `x^3 + y^3 + z^3 = 1`

6. Write a function `triangle` which works as follows:

   - The input of the function is 3×2 matrix

   $$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix}$$

   - As an output, the function draws the triangle in $\mathbf{R}^2$ connecting three points: (a_{11}, a_{12}), (a_{21}, a_{22}), and (a_{31}, a_{32})
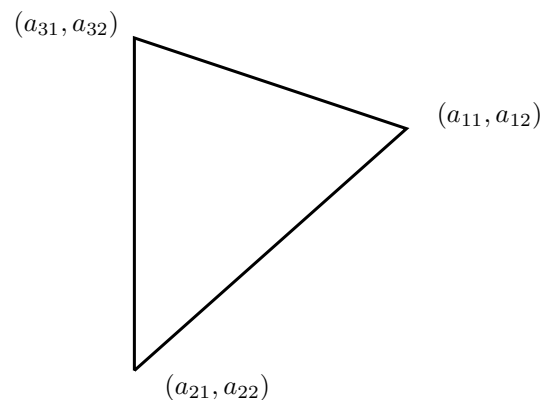
   - Fill in the inside of the triangle with a color by using the function `fill`