Question 5

There are three MATLAB files in this exercise:

- Call.m
- Armijo_LS.m
- grad_descent.m

In cal.m file, two sample functions are defined, and the gradient descent algorithm is called. The variable "optimalX" stores the final value of X found by the algorithm (the final minimum value).
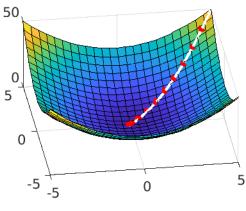
The Armijo_LS.m is used for checking the condition in each iteration to check if it satisfies the Armijo condition.
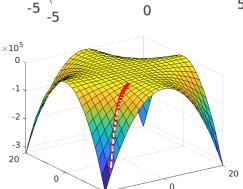
The gradient descent function works as follows:

First, a grid space is formed, and the function is plotted using surf function. Then the parameters for Armijo line search (rho , c , alpha) are set and the program goes through a loop to find the minimum of the function using gradient descent method. In each iteration, the previous value of X is stored in "startingPoint" . After updating the X value, the new value is stored in the "endpoint" variable. Having the starting point and end point in the given iteration, we are able to plot both the current point and the examined line(x+gamma*p).

Note : figure are also saved as Figure.fig and Figure2.fig and they are available in the folder.

The points in the following pictures are demonstrated as red and the examined line is represented as white: