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As the question states, the inputs of the function are only the objective function,the constraint and the parameter rho. As the derivative of the objective function and constraint function is not available to the function, their derivative should be approximated by central differencing(cdiff function).

The function to plot the results is called “plot\_penalty” and as the requirement states, it takes only the objective function and the constraint function and the parameter rho .

First the points are calculated using penalty path method and, in each iteration, the modified objective function(frho) is plotted.

Finally the objective function itself is plotted. The points found in each iteration is also plotted on the modified functions plot.

The “plot\_penalty.m” function is called in a script file named “call.m”

Chart

Description automatically generated

Trying different regions for the problem:

1)circle (h=@(x) (x(1)+1)^2+(x(2)+1)^2-1)

Chart

Description automatically generated

2)ellipse (h2=@(x) (((x(1)-2)^2)/4)+(((x(2)-1)^2)/6)-1)

Chart, surface chart

Description automatically generated

Chart, surface chart

Description automatically generated

3) Rosenbrock function as objective function on a line(h3=@(x) x(2)-2\*(x(1)-1))

Chart, surface chart

Description automatically generated

4) ) Rosenbrock function as objective function on (h3=@(x) x(2)-2\*(x(1)+1))

Chart, surface chart

Description automatically generated

5- Rosenbrock function as objective function on a circle(h=@(x) (x(1)+1)^2+(x(2)+1)^2-1)

Chart, surface chart

Description automatically generated