

Please refer to the Assignment rules document.

Exercise 1 (100/100)

Consider the highly non-linear Rosenbrock's function:

$$f(x, y) := (1 - x)^2 + 100(y - x^2)^2 \quad (1)$$

Let $x = (x, y)$. Consider the initial point $x_0 = (0, -2)^T$ and initial trust region radius $\Delta_0 = 0.75$.

1. Implement trust region method with search direction based on
 - Cauchy point (call the function TrCauchy.m).
 - Dogleg method (call the function TrDogleg.m).
2. Solve $\min_x f(x, y)$ by using both the implemented methods.
3. Plot the obtained steps on the energy landscape and compare performance of the methods.
4. Compare performance of the trust region method based on Dogleg and on Cauchy point for three different x_0 .
5. Compare performance of the trust region based on Dogleg method for three different Δ_0 .
6. (Bonus) Report the convergence history i.e., for each iteration, report the values of objective function, trust-region-radius, and the ratio of the actual reduction to the predicted reduction. (Please make a table.)