MATH3007 Assignment 9

Due in class (12pm), Dec 12th

Problem 1 (50pts). Consider the optimization problem:

$$\text{minimize}_{x_1,x_2} \quad 2x_1^4 + 3x_2^4 + 2x_1^2 + 4x_2^2 + x_1x_2 - 3x_1 - 2x_2$$

Use both the gradient method and Newton's method to solve this problem (choosing the starting point to be $(0, 0)$).

Problem 2 (50pts). Write a computer code in MATLAB using 1) the gradient projection method and 2) the Newton's method to solve the optimization problem (choose the starting point to be $(4, 0, 0)$)

$$\begin{aligned} \text{minimize} \quad & e^{x_1+x_2+x_3} + x_1^2 + 2x_2^2 + 3x_3^2 - 2x_1 - 7x_2 - 5x_3 \\ \text{subject to} \quad & x_1 + 2x_2 + 3x_3 = 4 \end{aligned}$$

Also use CVX to solve this problem and compare your solutions.