HW5

1. Implement the gradient method and use it to solve

$$\text{minimize } f(x_1, x_2) = 5x_1^4 + 6x_2^4 - 6x_1^2 + 2x_1x_2 + 5x_2^2 + 15x_1 - 7x_2 + 13.$$

Use the initial guess $(1,1)^T$. Use the accuracy of 10^{-6} in the stopping criteria. Show the norm of the gradient after each iteration. Record the number of iterations.

2. Implement Newton's method and use it to solve

$$\text{minimize } f(x_1, x_2) = 5x_1^4 + 6x_2^4 - 6x_1^2 + 2x_1x_2 + 5x_2^2 + 15x_1 - 7x_2 + 13.$$

Use the initial guess $(1,1)^T$. Use the accuracy of 10^{-6} in the stopping criteria. Show the norm of the gradient after each iteration. Record the number of iterations.

3. Implement the Newton based proximal-point method and use it to solve

$$\text{minimize } f(x_1, x_2) = 5x_1^4 + 6x_2^4 - 6x_1^2 + 2x_1x_2 + 5x_2^2 + 15x_1 - 7x_2 + 13.$$

Use the initial guess $(1,1)^T$. Use the accuracy of 10^{-6} in the stopping criteria. Show the norm of the gradient after each iteration. Record the number of iterations within the proximal step and the number of proximal steps (one proximal step is one minimization of the proximal function by Newton's method).