ECE 580 Spring 2009

Funwork #4

Due on February 23

1. For the function

$$f(x_1, x_2) = 4(x_1 - 2)^2 + (x_2 - 3)^2,$$

(a) Obtain the sequence of the first six points using the steepest descent method and locate these points on the level sets of f. The initial guess is $\boldsymbol{x}^{(0)} = \mathbf{0}$.

(b) Obtain the sequence of the first six points using the method of the gradient descent when $\alpha = 0.2$ and locate these points on the level sets of f. The initial guess is $\boldsymbol{x}^{(0)} = \mathbf{0}$.

2. Minimize

$$f(x_1, x_2) = \frac{1}{4}x_1^4 + \frac{1}{2}x_2^2 - x_1x_2 + x_1 - x_2$$

using the conjugate gradient algorithm. The initial guess is $\boldsymbol{x}^{(0)} = \mathbf{0}$. Locate the points on the level sets of f.

3. Minimize

$$f(x_1, x_2) = \frac{1}{4}x_1^4 + \frac{1}{2}x_2^2 - x_1x_2 + x_1 - x_2$$

using the rank one correction algorithm. The initial guess is $\boldsymbol{x}^{(0)} = \mathbf{0}$. Locate the points on the level sets of f.

4. Minimize

$$f(x_1, x_2) = \frac{1}{4}x_1^4 + \frac{1}{2}x_2^2 - x_1x_2 + x_1 - x_2$$

using the DFP algorithm. The initial guess is

- $\boldsymbol{x}^{(0)} = \mathbf{0}$;
- $\boldsymbol{x}^{(0)} = \begin{bmatrix} 1.5 & 1 \end{bmatrix}^T$.

Locate the points on the level sets of f.

5. Minimize

$$f(x_1, x_2) = \frac{1}{4}x_1^4 + \frac{1}{2}x_2^2 - x_1x_2 + x_1 - x_2$$

using the BFGS algorithm. The initial guess is

- $\boldsymbol{x}^{(0)} = \mathbf{0}$;
- $\boldsymbol{x}^{(0)} = \begin{bmatrix} 1.5 & 1 \end{bmatrix}^T$.

Locate the points on the level sets of f.

6. Exercise **12.3** from TEXT on page 238.

7. Exercise **12.9** from TEXT on page 240.