Assignment (3)

Due Date: 20/6/2016

1- Given the formula: $f(x) = -1.5x^6 - 2x^4 + 12x$

(a) Determine the maximum and the corresponding value of x for this function analytically (i.e., using differentiation).

(b) Use the golden sections method to determine the maximum value based on initial guesses of $x_l = 0$, $x_u = 2$.

(c) Employ Newton's method with initial guess of $x_0 = 2$ and perform three iterations.

2- The normal distribution is a bell-shaped curve defined by $y = e^{-x2}$, Use the golden-section search to determine the location of the inflection point of this curve for positive x.

3- Find the minimum of the function:

$$f(x) = 0.65 - \frac{0.75}{1+x^2} - \left[0.65 * x * \tan^{-1}\left(\frac{1}{x}\right)\right]$$

Using the Newton-Raphson method with the starting point $x = 0.1$. Use $\varepsilon = 0.01$ for checking the convergence.

4- Minimize $f(x_1,x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ starting from the point $X = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ using the cyclic method.

5- Resolve question (4) using Hooke and Jeevs method.

6- Resolve question (4) using the Steepest Descent method.

7- Use least-squares regression to fit a straight line for

x	0	2	4	6	9	11	12	15	17	19
y	5	6	7	6	9	8	7	10	12	12

Along with the slope and intercept, compute the standard error of the estimate and the correlation coefficient. Plot the data and the regression line. Then repeat the problem, but regress x versus y— that is, switch the variables. Interpret your results.