Class Project

Write a routine that performs a linesearch for α on the function $F(x + \alpha p)$ and exits when it satisfies the Γ conditions. Assume a maximum step is known (but could be large). The direction p and x are given and that p is a sufficient descent direction. Assume a routine is known that will evaluate $F(x)$ and its first derivatives. To test the routine invent some functions of your own.

Write a routine that minimizes a function $F(x)$ subject to the bounds $l \leq x \leq u$. You may use a modified-Newton or quasi-Newton approach. However, it is probably worth starting with steepest descent. You will eventually apply this algorithm to various forms of the hanging chain problem. Dealing with bounds on the variables is quite straight forward for the steepest descent algorithm. Basically if in the line search a bound will be violated then for the next iteration that variable is kept fixed on its bound. If a variable is already on its bound then the bound will be kept fixed on the upper bound, say u_i if $g_i \leq 0$ (the steepest decent step would increase that variable). Likewise, if it is kept on its lower bound it is kept fixed if $g_i \geq 0$. In the coming week we shall deal with the rules for the quasi-Newton method (they will be the same as the steepest descent) and the modified Newton (not the same).