Electricity poles have to be erected along a line, ***L*** [km] long. The deflection of the wires due to their weight increases with the span (*S*) between adjacent poles. In order to keep a requirement of a minimum clearance (***CL***) between the wires and the ground, taller poles are needed for longer spans. The height of a pole is $h=0.001*S^{\alpha} + CL$ [m] (rounded to the nearest higher 1m), where $1.5< \alpha <2.5$. The maximum allowable *h* is ***HM*** [m]. The cost of a pole is $c=\$(C_1+2\cdot h^{\beta})$, where C_1 is a fixed added cost and $1.5< \beta <2$. A crew of ***NW1*** workers is needed to erect poles of up to *h*=***HL*** [m], and ***NW2*** (>*NW1*) workers for taller poles. A crew can erect up to ***NP*** poles per day. The cost of a worker is C_2 [$/day]. A worker is paid for a full day even when the daily work is done in less than a day.

Assuming that all the spans are equal (uniform division), what are the optimal uniform span (*S*) and total number of poles (*N*) to minimize the cost of the operation? What is then that total cost?

Formulate the problem. Then write a text based computer program that solves the problem for various combinations of ***input*** parameters.

On the due date (Fri., 17 February, 2012, 2:30 p.m.) you have to submit a brief written report with a summary of the optimization equations and solution procedure (using the optimization procedure as shown in class), a flowchart, the text of the computer program and 6 examples (including printouts of input and output data for each example). You also have to submit one of the examples, for comparison and verification, using hand calculation optimization.