F. Finite Difference Methods (Introduction)

For this section, all necessary code is provided. You will need to tweak the code to work on your own machine and MS Excel version. Submission should consist of the working code, example Excel output files, and a document analyzing the accuracy of FDM versus the exact method. Alternatively, you may choose to modify the code to output to the console (instead of Excel).

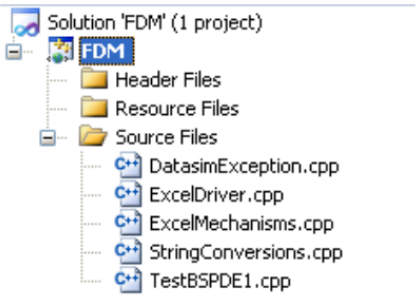
As FDM is a very advanced topic, this section is meant to be a brief taste of how FDM may be implemented using the C++ techniques learned throughout this course. However, students are not expected to understand the intricacies of FDM for option pricing, at this juncture, as that is the topic of a number of advanced MFE-level courses.

The objective is to run the code ***as is*** and is not intended as a course in the finite difference method.

The explicit Euler method is *conditionally stable* by which we mean that the mesh size k in time must be much less than the mesh size h in space (worst-case scenario is that $k = O(h^2)$). The objective of this exercise is to determine what the relationships are. Thus, for various values of h determine the value of k above which the finite difference approximation is no longer accurate.

Answer the following questions:

a) Compile and run the project as in and make sure that you get Excel output. Examine the code and try to get an idea of what is going on. The following files should be in the project:



b) In this exercise we test the FD scheme. We run the programs using the data from Batches1 to 4. Compare your answers with those from the previous exercises. That's all.

The working code is in the Exercise \Level 9\Exercise F\Projects\FDM alongwith the respective output excels present in the Section - a and Section - b directory.
For getting an idea of what is going ; we are determining the value of k depending on the basis of h and if the value of K is too high ; we are deciding the point where the FDM is no longer accurate.