1 Problem set 3: Operator splitting

1.1 Compute Λ^*

Extend your python class from problem set 2 (or use the example solution as template) to

1. Add the code required to compute Λ^*. The example solution indicates where to add the ca. 6 lines required. You only need to compute the tridiagonal (also: nearest neighbor) parts of Λ^* (the template provides enough storage for the full Λ operator, don't worry about this horrible waste of RAM).

2. Test that Λ^* is correct. The template provides 'hooks' for this test in an internal test facility. Until the test is 'perfect' to machine accuracy, it is pointless to progress... First test at the 'intensity' level, the at the 'J' level.

1.2 Operator splitting iterations

Use your new code to implement an operator splitting iteration (note: the template code has this facililty already ...) and calculate the results for $S = (1 - \epsilon)J + \epsilon B$ and $\epsilon = 1,\ 0.5,\ 0.1,\ 10^{-2},\ 10^{-4}$ (independent of τ for simplicity). Plot the convergence behaviors (corrections $\max(|\Delta J|/J)$ as functions of iteration number). Limit the number of iterations to 100 ... and profile the runs to see where the time is burnt (module 'cProfile' works well enough). Compare the results to the Λ iteration.