Worksheet 9

There is a quiz of basic understanding for lectures 8 and 9 on Keats.

1) [⋆] What would you use as the boundary conditions to price a digital call option? Use the implicit scheme for the heat equation to price a digital call option.
(Solution: see the file `priceDigitalCallByHeatEquationImplicit.m` in `lecture9.zip`)

2) [⋆] Implement the Crank-Nicolson scheme for the heat equation and use it to price a call option.
(Solution: see the file `priceCallByHeatEquationCrankNicolson.m` in `lecture9.zip`)

3) [⋆] Plot a graph of the convergence of the Crank-Nicolson scheme against δt keeping λ fixed.
(Solution: see the file `plotConvergence.m` in `lecture9.zip`)

4) Implement the Jacobi method and test that you can use it to solve an equation of the form $Ax = b$ with A a positive definite, symmetric, tridiagonal matrix.

5) Repeat the previous exercise with the Gauss-Seidel method

6) Repeat the previous exercise with Successive Over Relaxation (SOR)
(Solution: see the file `solveBySOR.m` in `lecture9.zip`)

7) [⋆] What methods have we covered to price derivatives in this course? Draw a table showing which methods you can apply to each of the following types of derivative:

- European call option
- European digital call option
- Asian option
- Knockout option

- American put option