Exercise 1

In the lectures, you have been introduced to several numerical schemes to discretize differential equations. In the first lecture, you have seen the Forward Euler scheme, applied to a set of differential equations for which analytical solutions exist, so that we could compare the chosen numerical scheme with the exact solution. It was also possible to check if kinetic energy was conserved.

Repeat the analysis of the numerical accuracy of lecture 1, but now for the **leap-frog scheme**, **Matsuno's scheme** and **Heun's scheme**. Reflect on your findings. Include plots like shown in lecture 1, i.e.:

1) u vs. analytic u
2) Kinetic energy
3) Velocity error

The code you have written may be included in an appendix, but this is not required.

Hand in this exercise no later than Tuesday, May 16th