

QUIZ #2

13:00, November 28 (Monday), 20 minutes, 10 points max
(no books, no notes)

Write your name and Email address on the top of this sheet
Write your answers on the reverse side

1. You are given the following partial differential equation

$$\begin{aligned} \partial_t u + u \partial_x u - \nu \partial_x^2 u &= f && \text{in } [-\pi, \pi] \times [0, T] \\ u &= u_0 && \text{in } [-\pi, \pi] \text{ at } t = 0 \end{aligned}$$

with periodic boundary conditions and where $f : [-\pi, \pi] \times [0, T] \rightarrow \mathbb{R}$. Propose a *spectral method* to solve this problem numerically. Discuss, in particular, the following issues:

- (a) treatment of the nonlinear term using the Galerkin and collocation methods; address the origins and possible handling of the aliasing errors,
- (b) choice of the time-integration schemes for the linear and nonlinear terms,

(10 points)