

Answers in Finnish or English

Focus on the essentials, and think before you write.

1. Explain **briefly** (a few lines each):

- a) Random walk and diffusion
- b) Error estimate in stochastic simulations
- c) Diffusion-limited aggregation
- d) Metropolis integration
- e) Expectation values by direct summation for the Ising model
- f) Ising model phase transition
- g) Molecular dynamics
- h) Richardson extrapolation
- i) Sparse matrices
- j) Lanczos diagonalization
- k) Mean-field approximation for bosons
- l) Quantum Monte Carlo

Use around one page (each line) for each question 2.-4:

- 2. Generating random numbers and using them to model deposition
- 3. Parallel computing
- 4. Solving quantum Heisenberg model on a computer