Tfy-3.4423 Computational Physics P (5 cr)   Final exam 27.5.2010

Answers in Finnish or English

Focus on computational aspects!

1. Explain **briefly** (a few lines maximum)
a) Random walk and diffusion
b) Error estimates from central limit theorem
c) Metropolis algorithm, what and why?
d) Detailed balance in Metropolis algorithm
e) Site percolation
f) Critical slowing down
g) Finite difference for Schrödinger equation
h) Richardson extrapolation
i) Finite element method
j) Sparse matrices
k) Energy derivative in variational quantum Monte Carlo
l) Importance sampling in diffusion quantum Monte Carlo

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

2. Physics from random numbers: deep thoughts and examples.

3. Simulating phase transitions.

4. Classical and quantum spin models.