Tfy-3.4423 Computational Physics P (5 cr) Final exam 17.5.2011

Answers in Finnish or English

Focus on the essentials, and think before you write.

1. Explain **briefly** (a few lines each):
a) Standard deviation and error estimate
b) Self-avoiding random walk
c) Markov chain as a board game
d) Ballistic and random deposition
e) Finite differences for the Schrödinger equation
f) Weak formulation in the finite element method
g) Exact diagonalization
h) Jastrow pair-correlation factor
i) Energy gradient fluctuations in the variational quantum Monte Carlo
j) Path integral
k) Density matrix for the free particle
l) Amdahl's law

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

2. Ising model and phase transition

3. Simulated annealing (from basics of method to new applications)

4. Many-body quantum mechanics on a computer