Universitetet i Oslo

Computational physics

FYS4150

Exercise 1

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Introduction

In this assignment we are going to solve a linear second-order differential equation numerically.

The programming language of choice is c++ and all programming was done in Qt.

Metod

Differential equations

Alot of physics problems involve solving a linear differential equations. Examples of these are the Schrödinger equation, diffusion equation and poisson's equation.

The thing all these equations have the form

$$\nabla f(x) = cf(x)$$

where $\nabla = \frac{\partial^2}{\partial x^2}$ the second order partial derivative. c is a constant and $f(x)$ is a known function.

Nummerical derivation

Derivation decribes the curvature of a function and the second order derivative decribes its slope. The general formula for the first order derivative is

$$\frac{\partial}{\partial x} = \frac{x_i - x_{i-1}}{h}$$