Mandatory Exercise 2

Numeriske metoder

Table of Contents

[Multi-dimensional root finding task 2](#_Toc194409507)

[Task 2](#_Toc194409508)

[Solution 2](#_Toc194409509)

[Workflow 2](#_Toc194409510)

[Full Terminal Solution 2](#_Toc194409511)

# Multi-dimensional root finding task

## Task

You are ordering cables, each with a resting length, L0, to be between pylons that are d = 30 meters apart. Ideally, you would like no "sagging", n = 0, but that would cause infinite string tension in the cable, so you need to choose a compromise between sagging and tension.

To inform the decision, you:

Determine L0 and (H) for n = 5.0, n = 2.0, n = 1.0, n = 0.5, n = 0.2, and n = 0.1

## Solution

I create a class called CableFunc that defines the system of equations that describe the physical setup.

CableFunc provides the function F(g) that newt needs to solve F(g) = 0. Each call to vecfunc(q) computes the residuals based on the current values in q.

To solve the task, i start out with a starting guess for n = 5 and look at the values that are computed. Using the computed values from n = 5 i make a new guess for n = 2 and repeat this process for the remaining n values.

## Workflow

1. Main sets up an initial guess q and instantiates vecfunc.
2. newt iteratively calls vecfunc(q), computes residuals, approximates the Jacobian, and updates q.
3. When converged, contains the solution, which main prints.

## Full Terminal Solution

A screen shot of a computer code

Description automatically generated