Intro to Optimization

AGRON 590 MG: Crop-Soil Modeling

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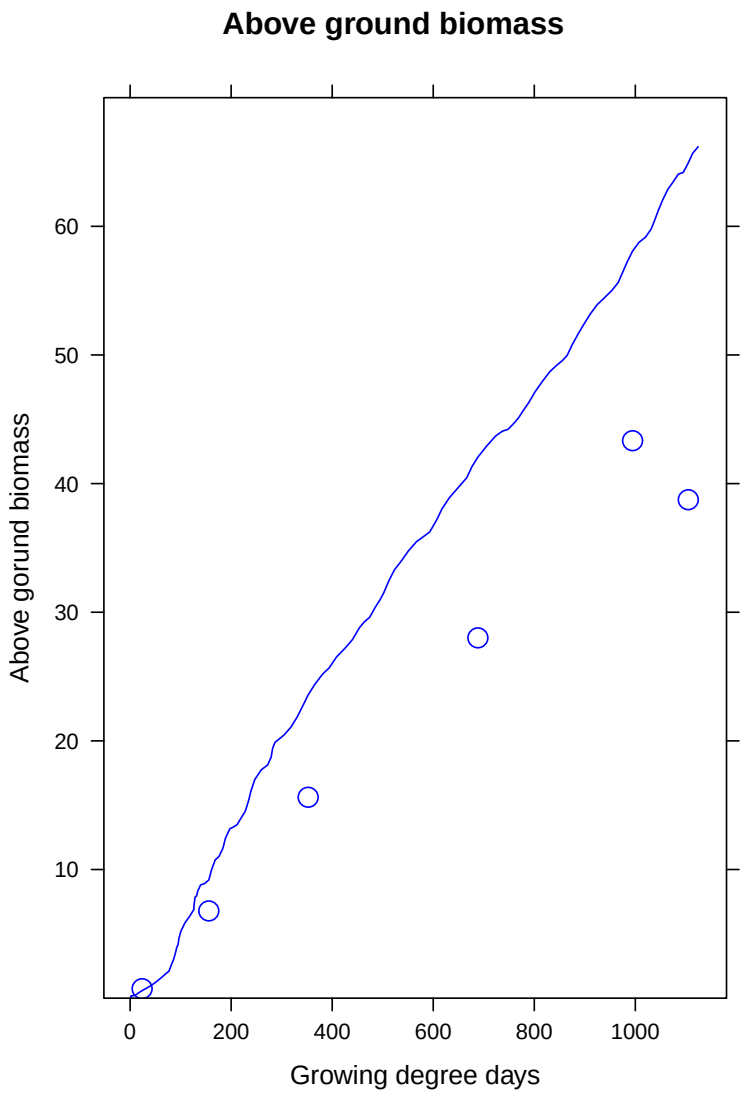
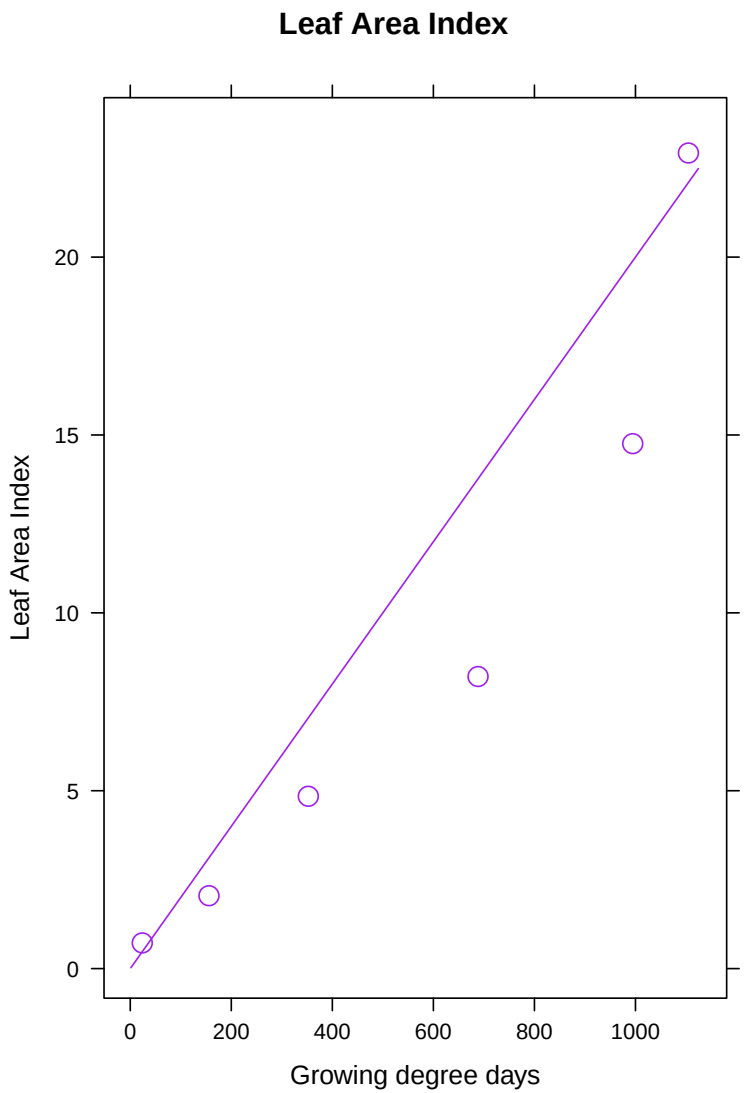
How do we improve model-data agreement?





Options for Improving model agreement

- Tweaking the model
- Brute force
- Mathematical approach

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Mathematical Definition Minimization example

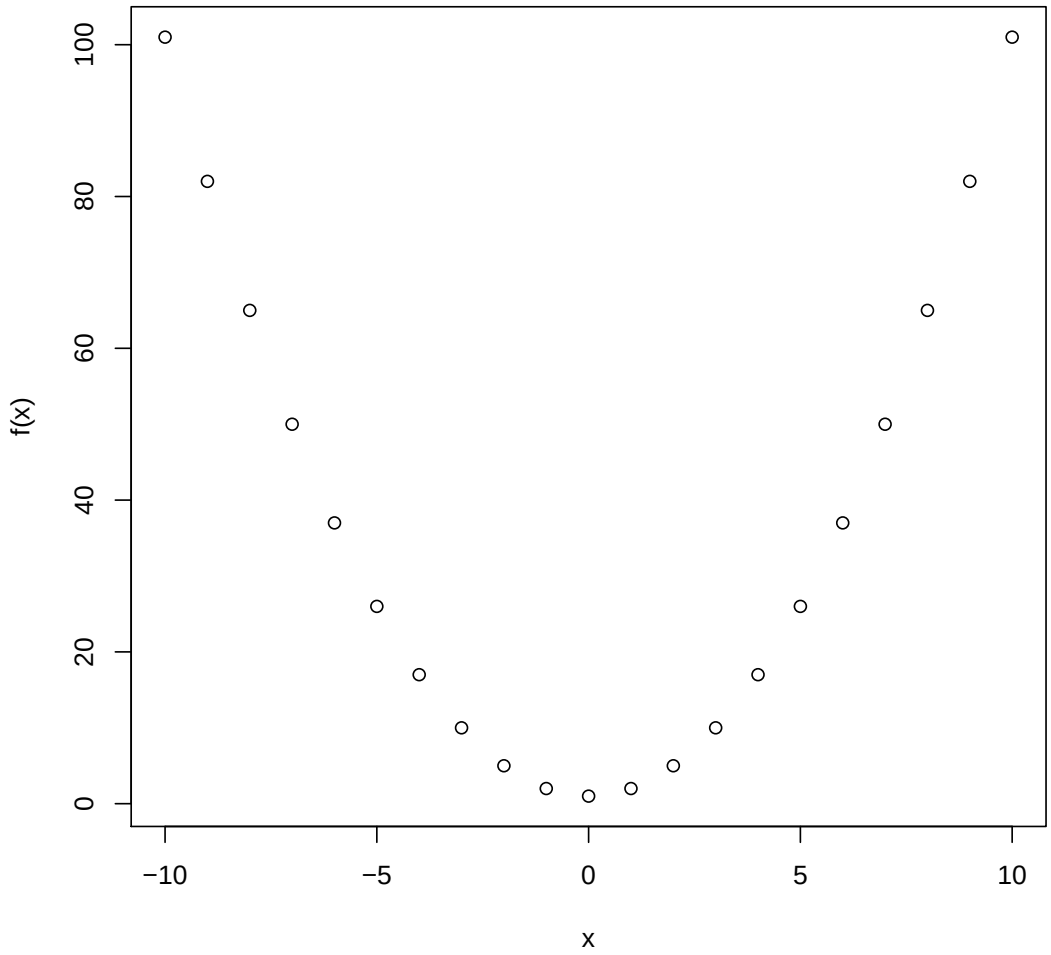
- Given $f : A \longrightarrow \Re$
- An element x_0 in A such that $f(x_0) \leq f(x)$ for all x in A

First problem: define the function

- This function is known as the *objective function* in the optimization literature.
- It is common to define the residual sum of squares as the objective function.
- There are limitations to this objective function.

Let's look at a simple example

- $$f(x) = x^2 + 1$$
- Visually f(x) is minimized at $x = 0$
- $$\frac{df}{dx} = 2x$$
- $$0 = 2x$$



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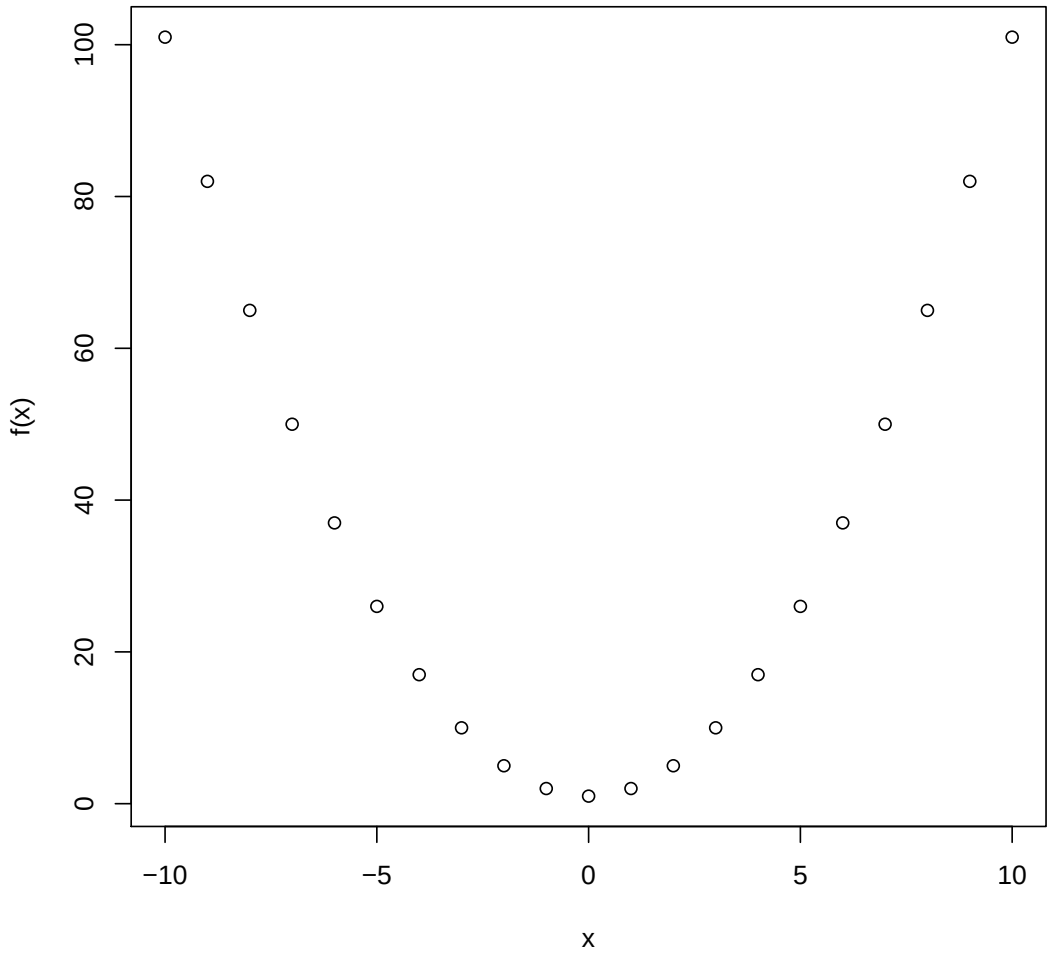

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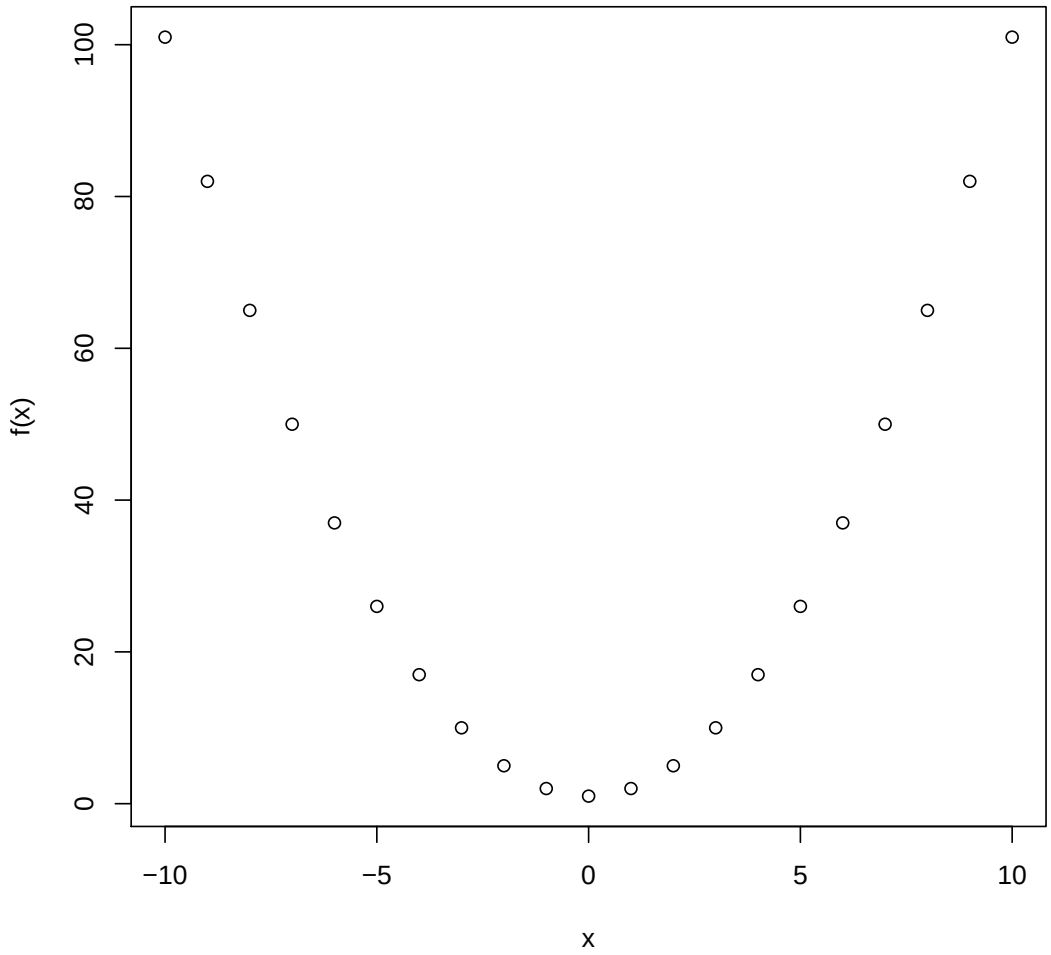

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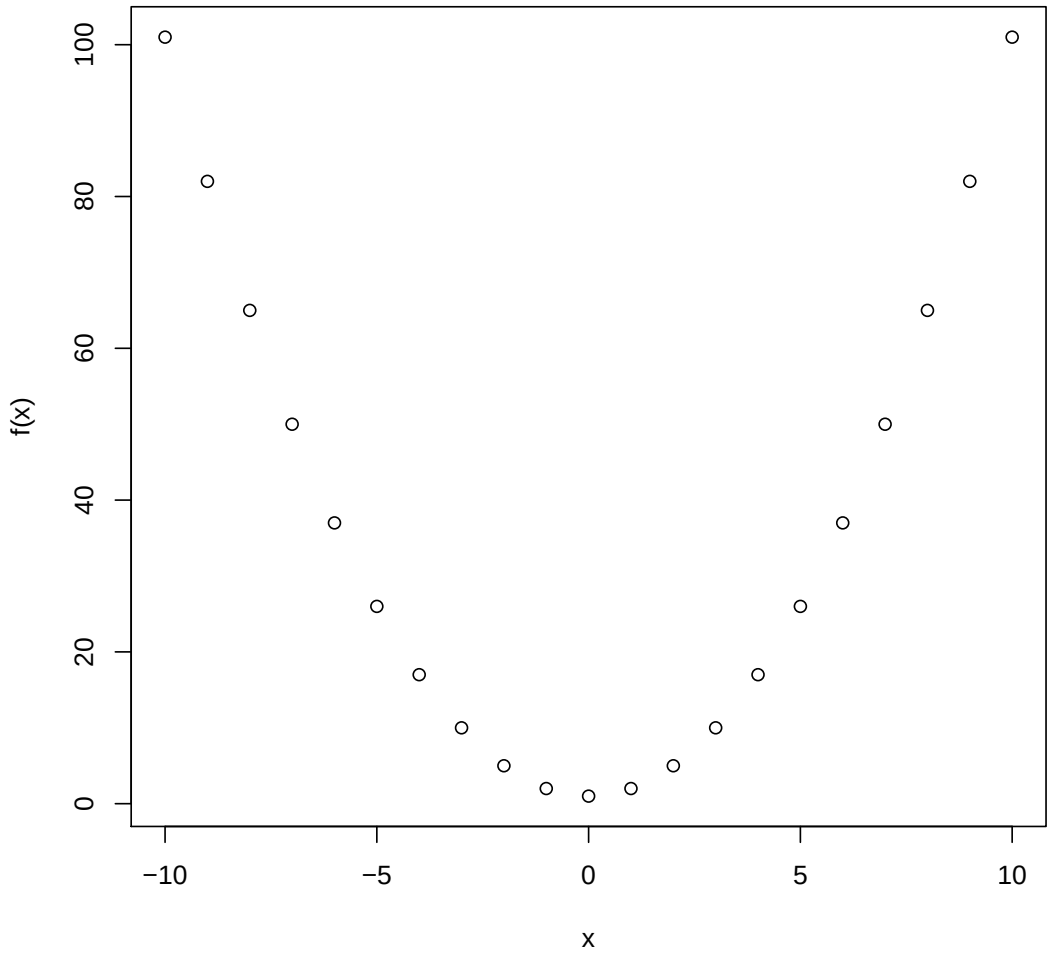

Can we use R to minimize this function?