

WEEKLY PARTICIPATION 7

Consider the simple but illustrative optimization problem

$$\boldsymbol{\omega}_* = \operatorname{argmin}_{\boldsymbol{\omega}} \frac{1}{2} \|\mathbf{H}\boldsymbol{\omega}\|_2^2.$$

Let $\boldsymbol{\omega}_0 = \mathbf{1}$ be the vector of all ones, and let $\mathbf{H} = \begin{pmatrix} \frac{1}{10} & 0 \\ 0 & 100 \end{pmatrix}$.

Using stepsize $\alpha = 1$:

- What is $\boldsymbol{\omega}_1$, the first iterate of gradient descent?
- What is $\boldsymbol{\omega}_1$, the first iterate of Newton's method?