

Hint on Homework Problem 1d:

We say an algorithm has rate of convergence p if there is a constant c so that, as k gets large,

$$\epsilon_{k+1} \equiv \|x_{k+1} - x^*\| \approx c\|x_k - x^*\|^p.$$

Take the log:

$$\log(\epsilon_{k+1}) \approx \log(c) + p \log(\epsilon_k).$$

So one way to estimate the convergence rate of our iteration is to plot $\log(\epsilon_{k+1})$ vs. $\log(\epsilon_k)$. If we fit a straight line to this data, the slope will approximate p and the intercept will approximate $\log(c)$.