Homework 2: Krylov Methods

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2

Structure

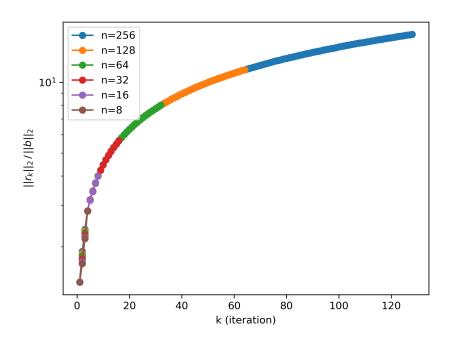
2.1

2.2

For the serial implementation of GMRES in python I chose to follow Algorithm 6.9 from *Iterative Methods for Sparse Linear Systems by Yousef Saad.* For solving the minimization problem in line 12 I used a QR factorisation algorithm (modified gram schmidt) I wrote last semester for another module, which was then followed by a back substitution function.

Figure shows for n=8,16,32,64,128,256 the serial gmres function run for m=n/2 iterations. In this plot we can see that the convergence rate of my gmres function is for a loglog plot almost a straight line which lets us conclude that that

$$\frac{||r_k||_2}{||b||_2} \propto n^{-a}$$



2.3