Homework 2: Krylov Methods
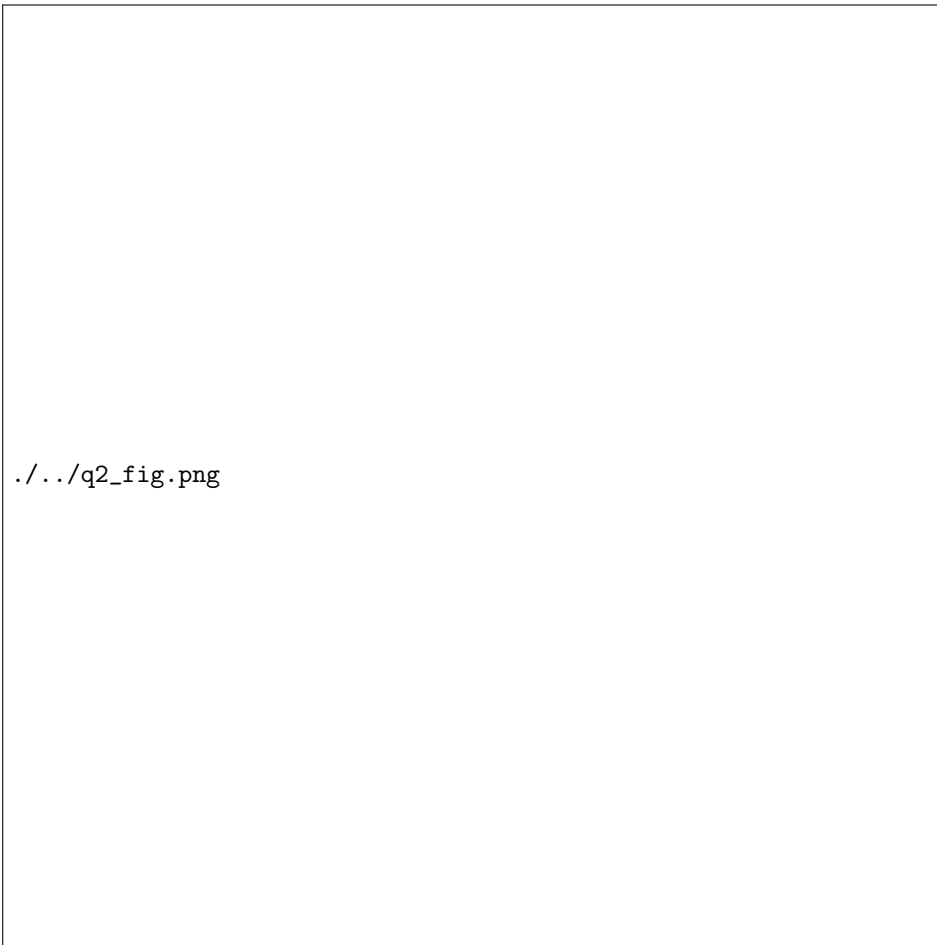
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Structure

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 conlude that that

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

2.3

./../q2_fig.png