Project 3 Raktim Biswas

n	A residual norm	Ahat residual norm	A k	Ahat k
10	9.0200e-16	5.4656e-19	10	10
100	3.7527e-15	8.6763e-09	100	21
1000	5.7600e-15	8.6723e-09	1000	21
2000	6.6289e-15	8.6722e-09	2000	21

A. We see that A always requires n steps to return a residual within 10^-8 due to round off error, and that Ahat requires only 21 steps for n >= 100. This is an indication that Ahat is a well-conditioned matrix for CG while A is not. Ahat demonstrates that CG finds a solution faster relative to n as n increases.
B. The method is effective as a direct method as we observed in the first approximation to CG using the conjugate direction method (and magic). The properties of the method did indicate that if rj = 0 when j < n, then the method ends early which we did observe. This is a result of having a set of A orthogonal (A conjugate) vectors for choosing a new direction for each iteration.
C. Resources
    a. https://github.com/hanyoseob/matlab-CG
    b. https://www.youtube.com/watch?v=eAYohMUpPMA&t=172s
    c. https://www.mathworks.com/matlabcentral/fileexchange/55087-conjugate-gradient-method