Exercise # 2. Iterative Methods For Linear Systems.

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Question 1

My implementation is slower to converge...

Question 2

The spectral condition number of A is

$$k = \frac{\lambda_{max}(A)}{\lambda_{min}(A)} \tag{1}$$

nx	h	k	sqrt(k)	iters CG	iters IC(0)	iters $IC(10^{-2})$	iters $IC(10^{-3})$
102	1.0000×10^{-4}	6.0107×10^{3}	77.5288	283	87	45	17
202	2.5000×10^{-5}	2.3810×10^{4}	154.3039	532	159	78	30
402	6.2500×10^{-6}	9.4770×10^{4}	307.8473	948	282	137	53
802	1.5625×10^{-6}	3.7814×10^{5}	614.9304	1792	533	258	97

Table 1: all data

nx	h	iters CG	iters IC(0)	iters $IC(10^{-2})$	iters $IC(10^{-3})$
102	1.0000×10^{-4}	283	87	45	17
202	2.5000×10^{-5}	532	159	78	30
402	6.2500×10^{-6}	948	282	137	53
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Table 2: Iterations for each value of nx

$h = \frac{1}{N} = \frac{1}{(nx-2)^2}$

Question 3

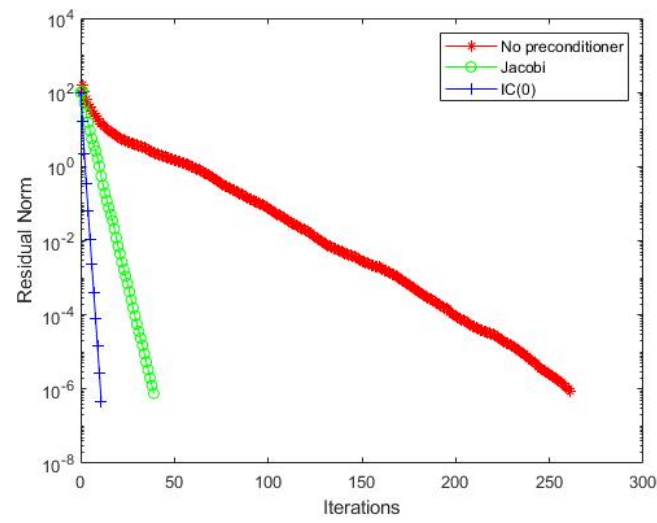show theoretically ?? only 1 iter??

Question 4

Figure 1: semilogy plot ex4

Question 5

Question 6

Question 7

Question 8