HW3 Pt 1

- What should r_n be in theory?

$A x = b$

$x = A \backslash b$

$x0 = [1 \ 1 \ 1]^T$

$r_n = \| x0 - x \|$

r_n should be 0.

- How many orders of magnitude?

17 (±1) orders of magnitude between cond(H_n) and r_n.

H_n is a poorly conditioned matrix & the residual grows quickly to 0 as N ↑s.

- Hilbert matrices are known to be very poorly conditioned so as $n >> 1$,

$$cond(H_n) \to \infty$$

- Why does condition number plateau at $N \geq 13$?

Because MatLab is not able to handle the number of elements in $\frac{1}{R}$ due to limitations on floats.

The round off error actually happens when computing H_n & when taking its inverse. The largest contributor is computing H_n