Exercise 1. Show that a rational number is not normal (to any base).

Exercise 2. Show that the sequence of fractional parts \( \{ \log n \} : n = 1, 2, \ldots \) is dense in \([0, 1)\).

Exercise 3. Using summation by parts, show that
\[
\sum_{n \leq x} \log n = x \log x - x + O(\log x)
\]
\[
\sum_{n=1}^{N} \frac{1}{n} = \log N + C + O\left(\frac{1}{N}\right)
\]
for some constant \(C\).