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 \( C \).