Exercise 2b

Task 1
Show that a binary tree with N leaves has at least height $\log_2(N)$.

Task 2 (Lemma 5 on slide 32)
Let $A \subseteq \{0,1\}^*$ with $|A| = N$, and let $1 \leq n \leq \log_2(N)$. Then at least $(1 - 2^{-n+1})N$ many words in A have length at least $\log_2(N) - n$.

Task 3
Sort the array $[2, 8, 13, 5, 7, 16, 3, 12]$ using Quicksort.