

ALGORITHMS, FALL 2018, HOMEWORK 4

Due Thursday, October 4 at 11:59pm.

Worth 2% of the final grade.

1. (a) Given a list of n real numbers, show how to decide in linear time whether it contains at least $\lceil \frac{n}{2} \rceil$ numbers, all with equal value.
(b) What if we want to know if there are at least $\lceil \frac{n}{100} \rceil$ numbers with equal value? Justify correctness.

2. We release k bees in a field with n flowers. k might be smaller, equal, or larger than n . Each bee decides to go to some random flower. Multiple bees can land on the same flower.
 - (a) What is the expected number of bees that will visit each flower?
 - (b) How many flowers do we expect will be visited?
 - (c) Does your solution for (b) confirm the intuitive answer for the special case where there is only one flower? Or what if there's only one bee? If we release 400 bees and there are 100 flowers, what's the answer?