

Algorithms and Data Structures

Summer Semester 2022

For discussion on Tuesday, May 24, 2022

1. Consider the `binary_sum` implementation from GTG Section 4.4.2 discussed in class. Prove the claim that when $n = 2^k$ for some positive integer k , then `binary_sum(n)` invokes exactly $2n - 1$ function calls.
2. Type the following into your Python console:

```
a=[1,2]
b=a
a[1]=3
b
```

What output do you expect? What output do you get? Explain!

3. Type the following in your Python console:

```
a=1
b=a
a=3
b
```

What output do you expect? What output do you get? Explain!

4. Write a piece of code which demonstrates experimentally that Python's `append`-method for lists is an $O(1)$ operation on average. I.e., show that n appends execute in $O(n)$ -time when n is large.

For time keeping and plotting, you can reuse much of the solution code to Exercise 1 on the first exercise sheet.