

## Exercise for Analysis of Algorithms

### Exercise T2

Let  $S_N$  be the expected number of pushes on the stack in the Quicksort program, where the input consists of a random permutation of  $N$  distinct keys. Analyze  $S_N$  for all values of  $N$  and  $M$ .

### Exercise T3

Let  $w \in \{a, b\}^n$  a word that has been chosen uniformly at random. How often is the body of the `while`-loop executed on average in the following algorithm? The function `is_palindrome` tests whether a word is a palindrome, i.e., the same when read backwards.

```
i = 2;
while (i <= n)
    if (is_palindrome(w[1], ..., w[i]))
        return true;
    i++;
return false;
```

### Exercise H2

We consider the following Algorithm. The array `a` contains a random permutation of the numbers  $1, \dots, N$ .

```
void doSomething(int *a, int N)
{
    int i;

    for (i=0; i<N-1; i++) /* 1 */
        while (a[i] > a[i+1]) /* 2 */
            a[i]--; /* 3 */
}
```

How often is line 3 executed on average?