1 Exercises

Exercise 1. Which is the running time $T(n)$ of following function, where the argument `a` is a list of n floats?

```
def f(a):
    return sum(a) / len(a)
```

Exercise 2. Suppose the running time $T(n)$ of an algorithm on inputs of size 1000, 2000, 3000, 4000, and 5000 is 5 seconds, 20 seconds, 45 seconds, 80 seconds, and 125 seconds, respectively. Which is the mathematical form of $T(n)$?

Exercise 3. How much memory (in bytes) does the list `['Alice', 'Bob', 'Carol']` occupy, assuming that a string of n characters occupies $2n$ bytes and a list of n items occupies $8n$ bytes?

Exercise 4. Suppose we are searching each of 1000 keys in a sorted list of 8192 keys.

a. How many comparisons are necessary in the worst case if we use linear search?

b. How many comparisons are necessary in the worst case if we use binary search (use base-2 logarithm)?

2 Solutions to Exercises

Solution 1. $T(n) = n$ (linear)

Solution 2. $T(n) = n^2$ (quadratic)

Solution 3. $26 + 24 = 50$ bytes

Solution 4.

a. $1000 \times 8192 = 8.192 \times 10^6$

b. $1000 \times \log 8192 = 1.3 \times 10^4$