

Quiz 3

The Art of Computer Programming

5 October 2026

Full name:

You have 10 minutes to answer this quiz, directly on this sheet of paper. No electronic devices or material of any kind is allowed. Do not forget to add your name above. Every question amounts to 2 points; the quiz is graded out of 10 points.

Questions

Q1. Circle the (only) correct answer. We search for an element x in a *sorted* array of n elements. In the worst case, the time taken is:

- a. $\Theta(n)$ with linear search and $\Theta(n)$ with binary search.
- b. $\Theta(\log n)$ with linear search and $\Theta(n)$ with binary search.
- c. $\Theta(n)$ with linear search and $\Theta(\log n)$ with binary search.
- d. $\Theta(n)$ with linear search and $\Theta(1)$ with binary search.

Q2.

```
count = 0
for i in range(n):
    j = 1
    while j < n:
        j = 2 * j
        count += 1
```

Using the $\Theta()$ notation, the time complexity of this Python code fragment, as a function of n , is

Q3. Circle the (only) correct answer. Let `l` be a Python list, `s` a set, and `d` a dictionary, each with n elements. Which of the following operations does *not* take constant time (on average for sets and dictionaries, amortized for `append`)?

- a. `d[k] = v`
- b. `x in s`
- c. `l.append(x)`
- d. `x in l`

Q4.

```
l1 = [1, 2, 3]
l2 = l1
l3 = l1[:]
l2.append(4)
l3.append(5)
print(len(l1))
```

What does this Python code fragment print?

Q5.

```
d = {'a': 1, 'b': 2}
d['c'] = 3
d['a'] = 4
print(f"{len(d)} {d['a']}")
```

What does this Python code fragment print?