

Quiz 5

1)

Consider the following pseudocode snippet:

```

i ← 1
while i ≤ n:
  i ← i + 1
  j ← 1
  while j ≤ n:
    j ← j + 1
    f()

```

$$\sum_{i=1}^n \sum_{j=1}^n 1$$

Which of the following expressions correctly describes the exact number of calls to f ?

Select one:

- a. $\sum_{i=1}^n (\sum_{j=1}^n 1)$
- b. $(\sum_{i=1}^n 1) + (\sum_{j=1}^n 1)$

what is used?

loop counting examples from Week 2

2)

Which sorting algorithm from the lecture does the pseudocode snippet below implement?

```

for j = 1, 2, ..., n do:
  for i = 1, 2, ..., n - 1 do:
    if A[i] > A[i + 1] then:
      Swap A[i] and A[i + 1]

```

→ swapping consecutive

elements!

Select one:

- a. Bubble sort
- b. Selection sort
- c. Merge sort
- d. Insertion sort

Sorts 1 from Week 3 session

3)

Which of the following sorting algorithms have the invariant that: after j steps, the j largest elements are at their correct place?

Select one or more:

- a. Merge sort → divide + conquer, nothing about the largest elements in the whole array
- b. Selection sort
- c. Bubble sort
- d. Insertion sort → elements get placed to the correct pos, and others get shifted, nothing about the "largest" ones

4)

Every comparison-based algorithm for searching in a sorted array of size n needs at least $\Omega(\log n)$ comparisons for every input.

Select one:

- True
- False

if the elements in 1st pos, only 1 comparison then

5)

Suppose we apply insertion sort to the array $A_n = [2, 3, 4, \dots, n-1, n, 1]$.

(E.g., $A_7 = [2, 3, 4, 5, 6, 7, 1]$).

Let $s(n)$ be the number of swap operations that are performed before the array is fully sorted (in ascending order).

Which of the following statements about $s(n)$ is true?

$n-1$ swaps

Select one:

- a. $s(n) = O(n)$
- b. $s(n) = \Omega(n^2)$

