

[2 marks] Fill in the blanks in the following sentences.

- The worst-case time complexity (in big-Oh notation) of the algorithm Insertion Sort for an input of size n is $O(n^2)$
- The worst-case time complexity (in big-Oh notation) of the algorithm Merge Sort for an input of size n is $O(n \log n)$

[3 marks] Write down whether each of the following statements are either true or false.

For large values of n (i.e. as $n \rightarrow \infty$):

- The function $n \log n$ is bounded by the function n^3 .

Write *true* or *false*: true

- The function 1 is bounded by the function n .

Write *true* or *false*: true

- The function 2^n is bounded by the function n^{100} .

Write *true* or *false*: false

[3/18] True or false:

- The function $n \log n$ is bounded by the function n^3 .

Write true or false: true

- The worst-case time complexity of the algorithm Merge Sort for an input of size n is $O(n \log n)$.

Write true or false: true

- The travelling salesperson problem is intractable.

Write true or false: true

[3 marks] Fill in the blanks in the following sentences.

For each of the following the answer is either *intractable*, *polynomial* or *unsolvable*:

- Sorting a list of integers into sorted order is an example of a polynomial problem.
- The travelling salesperson problem is an example of a intractable problem.
- The halting problem is an example of a unsolvable problem.

[4/23] The next two answers are taken from the following list of alternatives:

A: the class P

B: the class NP

C: the class P and the class NP

D: neither of the classes P and NP

The travelling salesperson decision problem belongs to [Answer A, B, C or D] : B

The problem of deciding whether a list of integers is in sorted order belongs to [Answer A, B, C or D] : C