1 of 10 QUESTIONS

QUESTION 1 5 marks

What does it mean when we say that an algorithm X is asymptotically more efficient than Y?

- X will be a better choice for all inputs
- X will be a better choice for all inputs except possibly small inputs
- X will be a better choice for all inputs except possibly large inputs
- Y will be a better choice for small inputs

Your submitted response was incorrect.

Explanation

When we say that an algorithm X is asymptotically more efficient than Y, we mean that as the size of the input to the algorithm grows larger and larger, the running time of X will eventually become faster than the running time of Y. This is typically expressed using big O notation, which gives an upper bound on the worst-case running time of an algorithm.

Specifically, if we say that X is asymptotically more efficient than Y, we mean that there exists a constant c such that for all sufficiently large inputs, the running time of X is at most c times the running time of Y, i.e., X has a lower big O complexity class than Y.

This means that for large inputs, X will always be a better choice than Y in terms of efficiency. However, for small inputs, it is possible that Y may still be faster than X. Therefore, we cannot say that X will always be a better choice for all inputs, but we can say that X will be a better choice for all inputs except possibly small inputs.