



Arab Academy for Science & Technology and Maritime Transport (AASTMT)  
College of Computing and Information Technology (CCIT)

Computing Alg. CS312

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## Exercises 2.1

1. For each of the following algorithms, indicate (i) a natural size metric for its inputs, (ii) its basic operation, and (iii) whether the basic operation count can be different for inputs of the same size:
  - a. computing the sum of  $n$  numbers
  - b. computing  $n!$
  - c. finding the largest element in a list of  $n$  numbers
  - d. Euclid's algorithm
  - e. sieve of Eratosthenes
  - f. pen-and-pencil algorithm for multiplying two  $n$ -digit decimal integers

## Exercises 2.2

1. Use the most appropriate notation among  $O$ ;  $\Theta$ ; and  $\Omega$  to indicate the time efficiency class of sequential search (Section 2.1 and copied below)
  - a. in the worst case.
  - b. in the best case.
  - c. in the average case.

```
ALGORITHM SequentialSearch(A[0..n - 1], K)
//Searches for a given value in a given array by sequential search
//Input: An array A[0..n - 1] and a search key K
//Output: The index of the first element in A that matches K
// or -1 if there are no matching elements
i ← 0
while i < n and A[i] ≠ K do
    i ← i + 1
if i < n return i
else return -1
```