

Name: _____

Brute-Force Algorithms

1. Define *brute-force* strategy:
2. What's usually the main disadvantage of brute-force strategy?
3. Advantages of brute-force strategy?
4. For each of these algorithms, write down the summation for the exact running time, and then determine the Big- Θ runtime.

(a) Selection Sort

ALGORITHM *SelectionSort*($A[0..n-1]$)

//Sorts a given array by selection sort

//Input: An array $A[0..n-1]$ of orderable elements

//Output: Array $A[0..n-1]$ sorted in nondecreasing order

for $i \leftarrow 0$ **to** $n-2$ **do**

$min \leftarrow i$

for $j \leftarrow i+1$ **to** $n-1$ **do**

if $A[j] < A[min]$ $min \leftarrow j$

 swap $A[i]$ and $A[min]$

(b) Bubble Sort

ALGORITHM *BubbleSort*($A[0..n-1]$)

//Sorts a given array by bubble sort

//Input: An array $A[0..n-1]$ of orderable elements

//Output: Array $A[0..n-1]$ sorted in nondecreasing order

for $i \leftarrow 0$ **to** $n-2$ **do**

for $j \leftarrow 0$ **to** $n-2-i$ **do**

if $A[j+1] < A[j]$ swap $A[j]$ and $A[j+1]$

(c) Brute-Force String Matching

ALGORITHM *BruteForceStringMatch*($T[0..n-1]$, $P[0..m-1]$)

//Implements brute-force string matching

//Input: An array $T[0..n-1]$ of n characters representing a text and

// an array $P[0..m-1]$ of m characters representing a pattern

//Output: The index of the first character in the text that starts a

// matching substring or -1 if the search is unsuccessful

for $i \leftarrow 0$ **to** $n-m$ **do**

$j \leftarrow 0$

while $j < m$ **and** $P[j] = T[i+j]$ **do**

$j \leftarrow j+1$

if $j = m$ **return** i

return -1