Deterministic Algorithms

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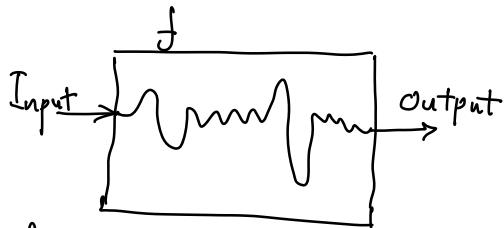
Input → → Output

For a given Input
① fix output
② fix Runtime

Randomized Algorithms

R1: Las Vegas Alg.
① fix output
② Variable Runtime

R_2: Monte Carlo Alg.
① Variable output
② fix Runtime

A Las Vegas Alg. for Q-Sort
(R-QSort)

QSort ($X_1 \cdots X_n$):
— Pivot = X_1
— j = Partition ($X_2 \cdots X_n$, Pivot)

| ≤ Pivot | Pivot | ≥ Pivot |

— QSort ($X_1 \cdots X_{j-1}$)
— QSort ($X_{j+1} \cdots X_n$)

eg.1

| 4 | 2 | 5 | 1 | 3 | 7 | 9 |

| 2 | 1 | 3 | 4 | 5 | 7 | 9 |

| 1 | 2 | 3 | | 5 | 7 | 9 |

| 7 | 9 |

$\log(n)$

eg.2

| 1 | 2 | 3 | 4 | 5 | 7 | 9 |

n
$n-1$
$n-2$
⋮
1

$$\sum_{i=1}^{n} i =$$
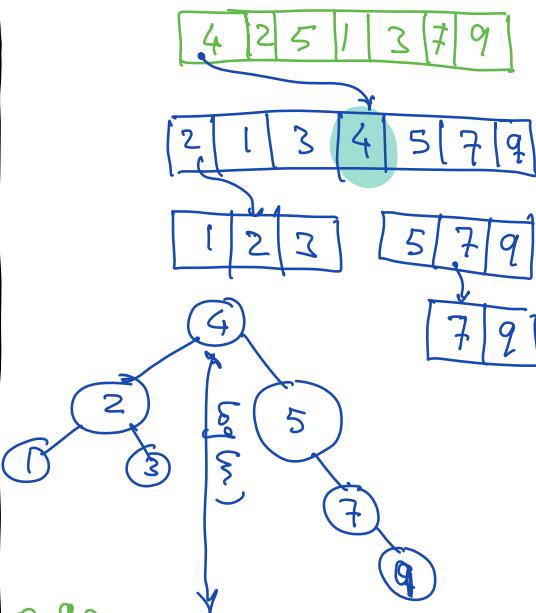
$$O(n^2)$$
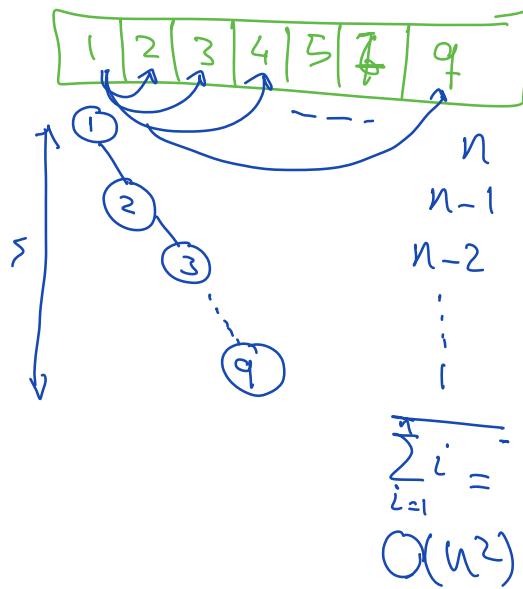
The Performance of
Q-Sort depends on the
Ordering in the Input