HW1 B505 Applied Algorithms

2020-09-05
Wesley Liao

1.

A = 31, 41, 59, 26, 41, 58

i = 1
41 > 31
31, 41, 59, 26, 41, 58

i = 2
59 > 41
31, 41, 59, 26, 41, 58

i = 3
26 < 59
26 < 41
26 < 31
26, 31, 41, 59, 41, 58

i = 4
41 < 59
41 = 41
26, 31, 41, 41, 59, 58

i = 5
58 < 59
58 > 41
26, 31, 41, 41, 58, 59

2.

(1) The algorithm will return the greatest number in the input array.
(2) O(n)

3.

((n/2) - 1) * (n - 2))
O(n^2)

4.

f(n) <= c * g(n)
f(n) = 1/n
g(n) = 1
1/n <= c * 1
true as long as c > 1/n_0 and n_0 > 0

5.

6.

(n, log n)

f(n) = O(g(n))
f(n) <= c * g(n)

log n < c * n
log n = O(n)

(n^2, 2^n)

f(n) = O(g(n))
f(n) <= c * g(n)

n^2 <= c * 2^n
true if c >= 1 and n >= 4

(2^n, 3^n)

f(n) = O(g(n))
f(n) <= c * g(n)

2^2 <= c * 3^n
true if c >= 1 and n >= 0

(log n, log^2 n)

f(n) = O(g(n))

f(n) <= c * g(n)

log n <= c * log^2 n
true if c >= 1 and n >= 2

7.

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A = array of length N
for i = 1 to N:
    k = random integer equal or greater to i and less than N
    swap A[i] with A[k]
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