43. RecInsertSort(A, j)

```
1  if j=n+1 then return A
2  else
3      key ← A[j]
4      i ← j-1
5      while i>0 and A[i]>key do
6          A[i+1] ← A[i]
7          i ← i-1
8      A[i+1] ← key
9      RecInsertSort(A, j+1)
```

$$T(n)=\begin{cases}\Theta(1) & \text{if } n=1\\ T(n-1)+(n-1) & \text{if } n>1\end{cases}$$

47. GeneratingPermutation()

```
1  for j ← 1 to n do
2      P[j] ← 0
3  Perm2(1)
Perm2(m)
1  if m=n+1 then output P[1...n]
2  else
3      for j ← 1 to n do
4          if P[j]=0 then
5              P[j] ← m
6              Perm2(m+1)
7              P[j] ← 0
```

45. Perm3(m)

```
1  if K=n then output P[1...n]
2  else
3      for K ← m to n do
4          if a<K<n+1 then
5              for L ← k+1 to n do
6                  min(a[L]) > a[K]
7                  swap[a[L], a[k]]
           reserve a[k+1 ... n]
```

智能科学与技术系

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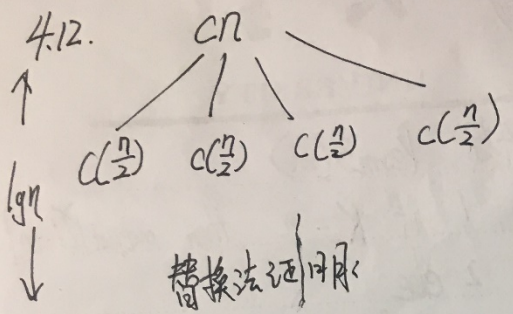
算法作业_03

第四章

4.12.



cn

2cn

$\sum_{i=0}^{\lg n} 2^i = \Theta(n^2)$

替换法证明：

猜想 $T(n) \le dn^2 - dn$. 假设对 $\lfloor n/2 \rfloor$ 成立，则：

$T(n) = 4T(\lfloor n/2 \rfloor) + cn \le 4(d\lfloor n/2 \rfloor^2 - d\lfloor n/2 \rfloor) + cn$

$\le dn^2 - 2dn + cn$

$\le dn^2 - dn + cn - dn$

只要 $cn - dn < 0$，即 $d > c$ 即可

4.1.5 (a) $a=4$, $b=2$, $\log_b a = 2$, $n^{\log_b a} = n^2 = \Theta(n^2)$

(b) 对于 $\varepsilon = 1$, $f(n) = O(n^{\log_2 4 - 1})$ 满足 4.1.(b), 则 $T(n) = \Theta(n^2)$

(c) 对于 $f(n) = \Theta(n^2)$, 则 $T(n) = \Theta(n^2 \lg n)$

(d) 对于 $\varepsilon = 1$, $f(n) = \Theta(n^{2+1})$, 则 $T(n) = \Theta(f(n)) = O(n^3)$