

# 数 学 作 业 纸

(科目: DS & AL)

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编号: 2017211872 (23) 第 1 页

1. acd

2. (1)  $\sum = 0; \rightarrow 1$

$\text{for}(i=0; i < n; i++) \rightarrow 1 + (n+1) + n$

$\sum++; \rightarrow n$

$$= 3n + 3 = \Theta(n)$$

Implement with C:

$n = 12345678 \Rightarrow \text{time} = 31 \text{ ms}$

$n = 56789012 \Rightarrow \text{time} = 141 \text{ ms}$

so the unit time is about  $8.25 \times 10^{-7} \text{ ms}$

$n = 66666666 \Rightarrow \text{calculated time} = (3 \times 66666666 + 3) \times 8.25 \times 10^{-7}$

$$= 165.00 \text{ ms}$$

$\Rightarrow \text{real time} = 156 \text{ ms}$

$n = 23333333 \Rightarrow \text{calculated time} = (3 \times 23333333 + 3) \times 8.25 \times 10^{-7}$

$$= 57.75 \text{ ms}$$

$\frac{\text{real time}}{\text{real time}} =$

$\text{real time} = 62 \text{ ms}$

So the real time is almost  $(3n+3) \times \text{unit time}$

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(2)  $\sum = 0; \rightarrow 1$

$\text{for}(i=0; i < n; i++) \rightarrow 1 + (n+1) + n$

$\text{for}(j=0; j < n; j++) \rightarrow n[1 + (n+1) + n]$

$\sum++; \rightarrow n^2$

$$= 3n^2 + 4n + 3 = \Theta(n^2)$$

from (1) we know the unit time is  $8.25 \times 10^{-7} \text{ ms}$

In code (2)

$n = 23333 \Rightarrow \text{calculated time} = (3 \times 23333^2 + 4 \times 23333 + 3) \times 8.25 \times 10^{-7}$

$$= 1347.54 \text{ ms}$$

$\text{real time} = 1219 \text{ ms}$

$n = 6666 \Rightarrow \text{calculated time} = 110.00 \text{ ms}$

$\text{real time} = 141 \text{ ms}$

$n = 77777 \Rightarrow \text{calculated time} = 14972.18 \text{ ms}$

$\text{real time} = 13204 \text{ ms}$

so the real time  $\approx (3n^2 + 4n + 3) \times \text{unit time}$

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(3)  $\sum = 0; \rightarrow 1$

$\text{for}(i=0; i < n; i++) \rightarrow 1 + (n+1) + n$

$\text{for}(j=0; j < n; j++) \rightarrow n[1 + (n+1) + n]$

$\sum++; \rightarrow n^3$

$$= 3n^3 + 4n + 3$$

$n = 233 \Rightarrow \text{calc time} = 31.31 \text{ ms}$

$\text{real time} = 31 \text{ ms}$

$n = 666 \Rightarrow \text{calc time} = 731.14 \text{ ms}$

$\text{real time} = 734 \text{ ms}$

$n = 1111 \Rightarrow \text{calc time} = 3394.05 \text{ ms}$

$\text{real time} = 3000 \text{ ms}$

so, real time  $\approx \text{calc time}$

(4)  $\sum = 0; \rightarrow 1$

$\text{for}(i=0; i < n; i++) \rightarrow 1 + (n+1) + n$

$\text{for}(j=0; j < i; j++) \rightarrow \sum [1 + (i+1) + i]$

$\text{for}(k=0; k < j; k++) \rightarrow \sum \sum [1 + (i+1) + i]$

$\sum++;$