

R.1.2

$$\begin{array}{l}
 10n \log n \leq n^2 \\
 10 \log n \leq n \\
 \log n^{10} \leq n \\
 \log n \leq \frac{n}{10} \\
 10^{\log n} \leq 10^{n/10} \\
 1 \times n \leq 10^{n/10} \\
 n^{10} \leq 10^n
 \end{array}
 \left. \begin{array}{l}
 \times n=2 \quad 1024 < 100 \\
 \vdots \\
 \times n=9 \quad 3486784401 < 1000000000 \\
 \checkmark n=10 \quad 10^{10} \leq 10^{10}
 \end{array} \right\}$$

Diagram:  $b^{\log a} = a^c$  with arrows pointing from  $b$  to  $10$  and from  $\log a$  to  $\log n$ .

R.1.6

- (1)  $4^n$     (2)  $2^n$     (3)  $n^3$     (4)  $n^2 \log n$   
 (5)  $4^{\log n}$     (6)  $4n^{3/2}$     (7)  $2n \log^2 n$     (8)  $n \log n$   
 (9)  $5n$     (10)  $\sqrt{n}$     (11)  $\log \log n$     (12)  $1/n$

R.1.10

Algorithm Loop1(n)

$$\begin{array}{ll}
 s \leftarrow 0 & O(1) \\
 \text{for } i \leftarrow 1 \text{ to } n \text{ do} & O(1) + O(n) \\
 \quad s \leftarrow s + i & O(n) + O(n)
 \end{array}
 \left. \begin{array}{l} \\ \\ \end{array} \right\}
 \begin{array}{l}
 2n + 3 \\
 O(n)
 \end{array}$$

R.1.14

Algorithm Loops(n)

$$\begin{array}{ll}
 s \leftarrow 0 & O(1) \\
 \text{for } i \leftarrow 1 \text{ to } n^2 \text{ do} & 1 + n^2 \\
 \quad \text{for } j \leftarrow 1 \text{ to } i \text{ do} & n^4 \\
 \quad \quad s \leftarrow s + i & n^4
 \end{array}
 \left. \begin{array}{l} \\ \\ \end{array} \right\} n^4$$