①

	A	B	O	o	Ω	ω	Θ	
a	$\lg^k n$	n^ϵ	Y	Y	N	N	N	
b	n^k	c^n	Y	Y	N	N	N	
c	$\sqrt{n}$	$n^{\sin n}$	Y	Y	N	N	N	
d	2^n	$2^{n/2}$	N	N	Y	Y	N	
e	$n^{\lg c}$	$c^{\lg n}$	Y	N	Y	N	Y	
f	$\lg(n!)$	$\lg(n^n)$	Y	N	Y	N	Y	

②

$$\sum_{i=1}^{n} c_i \le n + \sum_{j=0}^{\lfloor \lg n \rfloor} 3^j$$

$$n + \sum_{j=0}^{\lfloor \lg n \rfloor} 3^{\lfloor \lg n \rfloor - j}$$

Reordering the sum

$$n + 3^{\lfloor \lg n \rfloor} \cdot \sum_{j=0}^{\lfloor \lg n \rfloor} 3^{-j}$$

$$\le n + n \cdot 3$$

$$= 4n = O(n)$$

From Properties of logs (<=n) and geometric series (<= 3)