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Problem Set 1

# **Problem Set 1**

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### Problem 1-1.

- (a)  $f_1 = \log n^n = n \log n \in O(f_2), f_3 = \log n^{6006} = 6006 \log n \in \Theta(\log n).$  So that  $f_3 \in O(f_1).$  Meanwhile  $f_4 \in O(f_2),$  and  $f_5 \in O(f_3),$  the answer is  $(f_5, f_3, f_1, f_4, f_2).$
- **(b)** Since  $n \in O(2^n)$ ,  $f_1 \in O(f_3)$ . Also  $n \in O(n^2)$ ,  $n^2 \in O(2^n)$ ,  $f_1 = 2^n \in \Theta(6006^n) = \Theta(f_2)$  and  $f_3 = 2^{6006^n} \in \Theta(6006^{2^n}) = \Theta(f_4)$ , the answer is  $(\{f_1, f_2\}, f_5, \{f_3, f_4\})$ .
- **(c)**
- **(d)**

Problem Set 1

## Problem 1-2.

- (a)
- **(b)**

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## Problem 1-3.

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## Problem 1-4.

- (a)
- **(b)**
- **(c)**
- (d) Submit your implementation to alg.mit.edu.