Algorithms First Quiz
10:10 ~ 11:00

(2023/10/6)

(Note that if you design an algorithm, you must have pseudo code to show your algorithm and analyze the algorithm's time complexity in the worst case. It would help to put comments after your pseudo code to clarify your algorithm.)

1. (10%) Explain why the statement, "The running time of algorithm A is at least $O(n^2)$," is meaningless.

2. (10%) Prove or disprove the following questions. Is $2^{n+1} = O(2^n)$? Is $2^{2n} = O(2^n)$?

3. (10%) Mark True or False and justify all your answers to receive full credit.
$$f(n) = O\big(g(n)\big) \wedge f(n) = \Omega\big(h(n)\big) \Longrightarrow g(n) = \Theta\big(h(n)\big)$$

4. (20%) Describe a $\Theta(n \lg n)$-time algorithm that, given a set S of n integers and another integer x, determines whether or not two elements exist in S whose difference is exactly x.