

1.

Since  $T(n)$  is  $O(n)$

$$\text{So, } T(n) \leq C \cdot n$$

$$\leq C \cdot n^2 \quad (\text{if } n \geq 1)$$

$$\Rightarrow T(n) = O(n^2)$$

2.

(1)  $T(n) = O(n)$  same as class example

$$(2) \quad T(n) = \sum_{i=0}^{n-1} (n+1) = O(n^2)$$

$$(3) \quad T(n) = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} (n+1) = O(n^3)$$

$$(4) \quad T(n) = \sum_{i=0}^{n-2} n = O(n^2)$$

(5) Assume  $n = 2^k$

$$T(n) = k+1 = \log_2 n + 1 = O(\log_2 n)$$

(6)  $T(n) = \sum_{i=0}^{n-2} (x+1)$ , where  $x = 2^i$

$$= \sum_{i=0}^{n-2} (2^i + 1)$$

$$= O(2^n)$$