Lab 3 Complexity

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1 Lab 3 Questions

1.1 Q1

1. Derive a best case complexity for this algorithm for the number of comparisons made.

$$T(n) = \sum_{i=1}^{n-1} (1 - i + 1) \tag{1}$$

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

$$T(n) = n^2 - n - \frac{n(n)}{2} + n - 1 \tag{3}$$

$$T(n) = \frac{2n^2}{2} - \frac{n^2}{2} - \frac{2}{2} \tag{4}$$

$$T(n) = \frac{n^2 - 2}{2} \tag{5}$$

$$\frac{n^2 - 2}{2} \tag{6}$$

$$0(n) = n^2 \tag{7}$$

1.2 Q2

2. Is there any way to improve best case complexity (for the number of comparisons made) to O(n) ? Explain your answer using pseudocode.

```
Begin

simpleArray a[10] = {0,1,2,3,4,5,6,7,8,9};
    for(i is 2 to n)
        currentSwap = 0
for(j is 0 to n - 2)
```

```
    if(a[j] > a[j + 1])
        swap( a[j], a[j + 1] )
        currentSwap = currentSwap + 1
    if(currentSwap == 0)
        break

End
```