

Review 1

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Problem 1

1

Fill in the blank entries when the numbers are sorted by insertion sort in non-decreasing order.

7	4	3	6	8	1	2
7	4	3	6	8	1	2
4	7					

Solution 1

7	4	3	6	8	1	2
7	4	3	6	8	1	2
4	7	3	6	8	1	2
3	4	7	6	8	1	2
3	4	6	7	8	1	2
3	4	6	7	8	1	2

1	3	4	6	7	8	2
1	2	3	4	6	7	8

Problem 2

Fill in the blanks with proper number of iterations.

Solution 2

```
// INSERTION-SORT(A)           // cost // number of iterations
for j = 2 to n                 // c1   // n - 1
    key = A[j]                 // c2   // n - 1
    i = j - 1                  // c3   // n - 1
    while i > 0 and A[i] > key // c4   // tj
        A[i + 1] = A[i]       // c5   // tj - 1
        i = i - 1             // c6   // tj - 1
    A[i + 1] = key             // c7   // n - 1
```

Problem 3

What is the running time of insertion sort when the input size is n ?

Solution 3

- best case: $\theta(n) \ t_j = 1$
- worst case: $\theta(n^2) \ t_j = j$