

1 Exercises

Exercise 1. Consider sorting an array `a[]` containing the following strings:

E A S Y Q U T I O N

a. (*Selection Sort*) What is `a[]` when `i = 3` and after the exchange on line 10?

```

1  public static void sort(Comparable[] a) {
2      int n = a.length;
3      for (int i = 0; i < n; i++) {
4          int min = i;
5          for (int j = i + 1; j < n; j++) {
6              if (less(a[j], a[min])) {
7                  min = j;
8              }
9          }
10         exchange(a, i, min);
11     }
12 }
```

b. (*Insertion Sort*) What is `a[]` when `i = 4` and the inner loop (lines 4 – 6) is complete?

```

1  public static void sort(Comparable[] a) {
2      int n = a.length;
3      for (int i = 1; i < n; i++) {
4          for (int j = i; j > 0 && less(a[j], a[j - 1]); j--) {
5              exchange(a, j, j - 1);
6          }
7      }
8  }
```

c. (*Shell Sort*) What is `a[]` after a 4-sort, ie, after the first iteration of the second while loop (lines 7 – 14)?

```

1  public static void sort(Comparable[] a) {
2      int n = a.length;
3      int k = 1;
4      while (k < n / 3) {
5          k = 3 * k + 1;
6      }
7      while (k >= 1) {
8          for (int i = k; i < n; i++) {
9              for (int j = i; j >= k && less(a[j], a[j - k]); j -= k) {
10                 exchange(a, j, j - k);
11             }
12         }
13         k /= 3;
14     }
15 }
```

2 Solutions

Solution 1.

a. A E I N Q U T S O Y

b. A E Q S Y U T I O N

c. E A S I O N T Y Q U