

02393 C++ Programming Exercises

Week 9, October 31, 2016

Hand-in via `dtu.codejudge.net`, before November 7, 5pm

This exercise is to practice recursive programming, therefore please try to avoid solving them with loops. In all cases input is to be read from `cin` and the result is to be provided to `cout`.

Reverse Write a program that reverses a sequence of integers, as provided in the standard input.

For example, if the input is

```
1 2 3 4 5
```

then the output should be

```
5 4 3 2 1
```

Palindrome Write a program that decides whether a sequence of integers is a palindrome, i.e. if reading the sequence from right to left results in the very same sequence.

For example, if the input is

```
13 22 33 22 13
```

then the output should be

```
yes
```

but if the input is

```
13 22 31
```

then the output should be

```
no
```

since the right-to-left reading is

```
31 22 13
```

Note that the right-to-left reading does not refer to individual digits, but to entire numbers.

The Levenshtein distance The Levenshtein distance between two sequences of characters $u = u_1, u_2, \dots, u_k$ and $v = v_1, v_2, \dots, v_l$ is defined by:

$$d(u, v) = \begin{cases} |v| & \text{if } |u| = 0, \\ |u| & \text{if } |v| = 0, \\ \min \begin{cases} d(u^1, v) + 1 \\ d(u, v^1) + 1 \\ d(u^1, v^1) + f(u_1, v_1) \end{cases} & \text{otherwise.} \end{cases}$$

where $|w|$ denotes the length of a sequence w ; w^1 denotes the suffix w_2, w_3, \dots of a sequence $w = w_1, w_2, w_3, \dots$; w_1 denotes the first element of a sequence $w = w_1, w_2, w_3, \dots$; and $f(e, e')$ is 0 when $e = e'$ and 1 otherwise.

As an example you can easily check that the distance $d("AB", "B")$ between "AB" and "B" is 1 since:

$$\begin{aligned} d("AB", "B") &= \min(d("B", "B") + 1, d("AB", "") + 1, d("B", "") + 1) = \min(1, 3, 2) = 1 \\ d("B", "B") &= \min(d("", "B") + 1, d("B", "") + 1, d("", "") + 0) = \min(2, 2, 0) = 0 \\ d("AB", "") &= 2 \\ d("B", "") &= 1 \\ d("", "B") &= 1 \end{aligned}$$

Write a program that reads two words and returns their distance.