Rotate vector — X92646_en

Write a subprogram that, given a vector $v = (v_0, v_1, \ldots, v_{n-1})$ of n integers and an integer $k \geq 0$, rotates the contents of v k places to the right, so that after execution $v = (v_{n-k}, \ldots, v_{n-1}, v_0, \ldots, v_{n-k-1})$.
For instance, if $v = (10, 21, 32, 47, 54, 61)$, applying the procedure `rotate_right` with $k = 2$ modifies v so that it now contains $v' = (54, 61, 10, 21, 32, 47)$. Notice that $k = 0$ leaves the vector v unmodified.
HINT: The best solution for this problem does not use any additional vector. Instead, it applies the following trick: to rotate a vector k places to the right, you can **reverse** parts of the vector three times, as the following example illustrates, with $v = (10, 21, 32, 47, 54, 61)$ and $k = 2$.

1. Reverse the whole vector. We obtain: $v' = (61, 54, 47, 32, 21, 10)$.
2. Reverse the first k positions of the resulting vector. We get $v'' = (\mathbf{54,61}, 47, 32, 21, 10)$.
3. Finally, reverse the last $n - k$ positions, which results in $v''' = (54, 61, \mathbf{10,21,32,47})$.

You MUST use the C++ code below, completing ONLY the indicated parts. Changing the main(), or any of the headers of subprograms will render your submission INVALID.

```
#include <iostream>
#include <vector>
using namespace std;

// reads the  contents of an integer vector of size n  from cin
vector<int> read_vector(int n) {
     vector<int> v(n);
     for (int i = 0; i < n; ++i)
         cin >> v[i];
     return v;
}

void swap(int& x, int& y) {
    int z = x;
    x = y;
    y = z;
}

// reverses a vector in the segment between from and to
void reverse(vector<int>& v, int from, int to) {
    // ADD YOUR CODE HERE
}


// rotates the vector as explained in the statement of the problem
void rotate_right( // ADD APPROPRIATE PARAMETERS ) {
    // ADD YOUR CODE HERE
```

```
}

// write a vector of n integers to cout, with blanks to separate
// the n values
void write_vector(const vector<int>& v) {
    // ADD YOUR CODE HERE
}

int main() {
    int n; cin >> n;
    vector<int> v = read_vector(n);
    int k; cin >> k;
    rotate_right(v, k);
    write_vector(v); cout << endl;
}
```

Exam score: 2.500000 **Automatic part:** 0.000000%

Input

A natural number $n \geq 0$, followed by the n integer vector elements. Then a natural number $k \leq n$.

Output

The vector of n integers rotated k positions to the right.

Sample input

```
10
0 1 2 3 4 5 6 7 8 9
4
```

Sample output

```
6 7 8 9 0 1 2 3 4 5
```

Problem information

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