

# Personal Competitive Programming Notebook

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# 1 C++

## 1.1 C++ template

```
#include <bits/stdc++.h>
using namespace std;

int main()
{
    ios_base::sync_with_stdio(false);
    cin.tie(NULL);
    cout.tie(NULL);
    return 0;
}
```

## 2 Type Conversion

### 2.1 string to number

```
// stof - float
// stod - double
// stold - long double

// stoi - int
// stol - long
// stoul - unsigned long
// stoll - long long
// stoull - unsigned long long

int x = stoi("789.19");
// Output: 789
```

### 2.2 number to string

```
string x = to_string(475.1);
// Output: 475.100000
```

### 2.3 int to char

```
// Any int
char x = 97;
// Output: a

// The int is a number from 0 to 9 and want to obtain the
// same number
char x = 5 + '0';
// Output: 5
```

### 2.4 char to int

```
// Any char
char y = 'a';
int x = y;
// Output: 97

// The char is a number and want the same number as int
char y = '5';
int x = y - '0';
// Output: 5
```

## 3 Chars

### 3.1 Change Case

```
char letter = tolower('A');
// Output: a

char letter = toupper('a');
// Output: A
```

### 3.2 Check Case

```
islower('a');
// Output: true

isupper('A');
// Output: true
```

## 4 Strings

### 4.1 Substring

```
string text = "Apple, Banana, Kiwi";
// Second param is optional, default text.length
text.substr(7, 6);
// Output: Banana
```

### 4.2 Erase

```
string text = "Apple, Banana, Apple";
text.erase(7, 6);
// Output: "Apple, , Apple"
```

### 4.3 Replace

```
bool replace(string &str, const string &from, const
string &to)
{
    size_t start_pos = str.find(from);
    if (start_pos == string::npos)
        return false;
    str.replace(start_pos, from.length(), to);
    return true;
}

string text = "Apple, Banana, Apple";
replace(text, "Apple", "Banana");
// Output: Banana, Banana, Apple
```

### 4.4 Replace All Matches

```
void replaceAll(string &str, const string &from, const
string &to)
{
    if (from.empty())
        return;
    size_t start_pos = 0;
    while ((start_pos = str.find(from, start_pos)) !=
string::npos)
    {
        str.replace(start_pos, from.length(), to);
        start_pos += to.length();
    }
}

string text = "Apple, Banana, Apple";
replaceAll(text, "Apple", "Banana");
// Output: Banana, Banana, Banana
```

### 4.5 Change Case

```
string st = "ApPlE";
// To lower case
transform(st.begin(), st.end(), st.begin(), ::tolower);
// Output: apple
// To upper case
transform(st.begin(), st.end(), st.begin(), ::toupper);
// Output: APPLE
// Capitalize
transform(st.begin(), st.end(), st.begin(), ::tolower);
st[0] = toupper(st[0]);
// Output: Apple
```

### 4.6 Trim

```
void ltrim(string &s)
{
    s.erase(s.begin(), find_if(s.begin(), s.end(), !::
isspace));
}

void rtrim(string &s)
{
    s.erase(find_if(s.rbegin(), s.rend(), !::isspace).
base(), s.end());
}

string text = " ' Apple ' ";
ltrim(text);
rtrim(text);
// Output: ' Apple '
```

### 4.7 Split

```
vector<string> split(string str, string token)
{
    vector<string> result;
    while (str.size())
    {
        int index = str.find(token);
        if (index != string::npos)
        {
            // Push until token
            result.push_back(str.substr(0, index));
            // Remove text from 0 to index + token size
            str = str.substr(index + token.size());
            // Cause token was last content, it should be
            splitted
            if (str.size() == 0)
                result.push_back(str);
        }
        else
        {
            result.push_back(str);
            str = "";
        }
    }
    return result;
}

vector<string> tokens = split(" Apple Banana Apple ", "
");
// Output: ["", "Apple", "Banana", "", "Apple", ""]
```

---

## 4.8 Compare Lexicographically

```
string a = "abcd";
string b = "bcde";

if (a < b)
    cout << "a is first";
else if (a < b)
    cout << "b is first";
else
    cout << "same";

// Output: a is first
// Note: You can order lexicographically a vector with
// sort
```

---

## 5 Vectors

### 5.1 Read

```
// Declaration: vector<type> arr(size, default);
// (size, default) params are optional
copy_n(istream_iterator<type>(cin), times, back_inserter(
    vec));
```

---

### 5.2 Print

```
copy(vec.begin(), vec.end(), ostream_iterator<type>(cout,
    " "));
```

---

### 5.3 Sort

```
// This works with any data type
vector<int> vecs = {2, 3, 1, 4};

sort(vecs.begin(), vecs.end());
```

```
// Ascending: [1, 2, 3, 4]
sort(vecs.begin(), vecs.end(), ::greater<int>());
// Descending: [4, 3, 2, 1]
```

---

### 5.4 Count

```
// Count how many 12's are in vec.
count(vec.begin(), vec.end(), 12);
```

---

### 5.5 Erase

```
vector<int> arr = {0, 1, 2, 3, 4, 5};

// Erase One Element At Index
arr.erase(arr.begin() + 1);
// [0, 2, 3, 4, 5]

// Erase from a to b (doesn't include b)
arr.erase(arr.begin() + 1, arr.begin() + 4);
// [0, 4, 5]
```

---

## 6 Useful Stuff

### 6.1 Swap values

```
int a = 1, b = 2;
swap(a, b);
// A will be 2 and b will be 1
```

---

### 6.2 Cout Float Point Precision

```
cout << setprecision(20) << fixed;
```

---