

# GeeksforGeeks

A computer science portal for geeks

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## Lower case to upper case – An interesting fact

Problem: Given a string containing only lowercase letters, generate a string with the same letters, but in uppercase.

Input : GeeksForGeeks

Output : GEEKSFORGEEKS

The first method that comes to our mind is

```
// C++ program to convert a string to uppercase
#include <iostream>
using namespace std;

// Converts a string to uppercase
string to_upper(string &in)
{
    for (int i = 0; i < in.length(); i++)
        if ('a' <= in[i] <= 'z')
            in[i] = in[i] - 'a' + 'A';
    return in;
}

// Driver code
int main()
{
    string str = "geeksforgeeks";
    cout << to_upper(str);
    return 0;
}
```

Run on IDE

Output :

GEEKSFORGEEKS

A more interesting solution, on the other hand, would be:

```
// C++ program to convert a string to uppercase
#include <iostream>
using namespace std;

// Converts a string to uppercase
string to_upper(string &in)
{
    for (int i = 0; i < in.length(); i++)
        if ('a' <= in[i] <= 'z')
```

```
        in[i] &= ~(1 << 5);
    return in;
}

// Driver code
int main()
{
    string str = "geeksforgeeks";
    cout << to_upper(str);
    return 0;
}
```

[Run on IDE](#)

Output :

GEEKSFORGEES

**Explanation:** The [ASCII table](#) is constructed in such way that the binary representation of lowercase letters is almost identical of binary representation of uppercase letters. The only difference is the sixth bit, setted only for lowercase letters. What that elegant function does is unset the bit of index 5 of in[i], consequently, making that character lowercase.

**Disadvantages:** That strategy works only for alphabetical characters. If the input contains numbers or punctuations, we'll have to use the naive way.

**Example:** Character 'A' is integer 65 = (0100 0001)<sub>2</sub>, while character 'a' is integer = 97 = (0110 0001)<sub>2</sub>. (Note that 97 – 65 = 32. Can you guess why?)

#### Exercises:

1. Write a function to make all letters of a string lowercase. Example: GeeksForGeeks turns geeksforgeeks.
2. Write a function that change the case of a string. Example: GeeksForGeeks turns gEEKSfORgEEKS.

This article is contributed by **Igor Carpanese**. If you like GeeksforGeeks and would like to contribute, you can also write an article and mail your article to [contribute@geeksforgeeks.org](mailto:contribute@geeksforgeeks.org). See your article appearing on the GeeksforGeeks main page and help other Geeks.

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