Histogram

Write a program to print a histogram of the frequencies of different characters in its input.

Input

Hello, World!

Output

```
------------------------------------------------------------
' '|X
'H'|X
'e'|X
'l'|XXX
'o'|XX
','|X
'W'|X
'r'|X
'd'|X
'!'|X
------------------------------------------------------------
```

Hint: See Section 1.5.4 (Use `getchar()` instead of `scanf()`)

Reverse

Write a function `reverse(s)` that reverses the character string `s`. Use it to write a program that reverses its input a line at a time.

Hint: See Section 1.9 (Implement the `getline` function to read a line)

Comment Removal

Write a program to remove all comments from a C program. C comments don't nest. Print the result in the output.

Hint: Use '<' to redirect `stdin` and read from a file (See Lab's Chapter 1).

Input

```
// Single-line "comment"
#include <stdio.h>
/* This is a multi-line comment,
which ends here. */
int main() {
   printf("Hello World!"); // Another 1 line comment
   return 0;
}
```

Output

```
#include <stdio.h>
int main() {
   printf("Hello World!");
   return 0;
}
```

Hex to Decimal

Write a function `htoi(s)`, which converts a string of hexadecimal digits (including an optional `0x` or `0X`) into its equivalent integer value. The allowable digits are 0 through 9, a through f, and A through F.

Hint: Your program takes one hex number and prints its equivalent decimal representation using your `htoi(s)` function.

Input

```
0x1A
```

Output

```
26
```

Lower

Rewrite the function `lower` (see Section 2.7), which converts upper case letters to lower case, with a conditional expression instead of `if-else` .

Input

```
HELLO
```

Output

```
hello
```

Circular Right Shift (Right Rotation)

Write a function `unsigned char rightrot(unsigned char x, unsigned char n)` that returns the value of the number `x` rotated to the right by `n` positions.

Input

```
3
```

Output

```
129
```