

1) Type the following code and observe the output to know the working of increment and decrement operators

```
#include <stdio.h>

int main()
{
    int a = 10, b = 100;

    float c = 10.5, d = 100.5;

    printf("++a = %d \n", ++a);

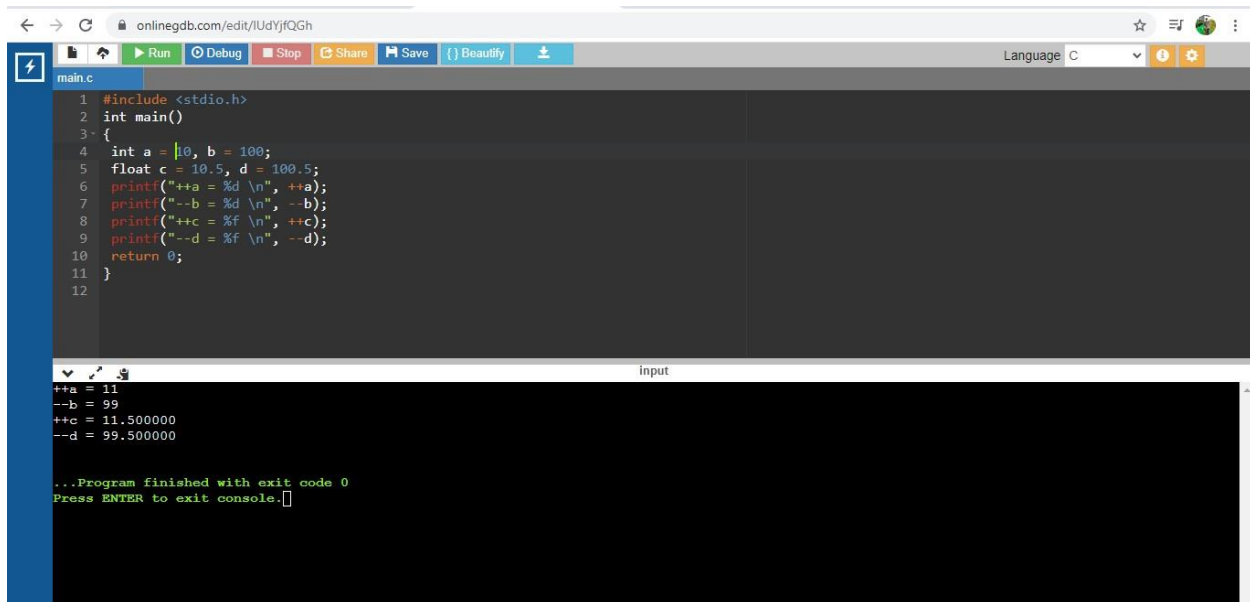
    printf("--b = %d \n", --b);

    printf("++c = %f \n", ++c);

    printf("--d = %f \n", --d);

    return 0;
}
```

Output:



```
main.c
1 #include <stdio.h>
2 int main()
3 {
4     int a = 10, b = 100;
5     float c = 10.5, d = 100.5;
6     printf("++a = %d \n", ++a);
7     printf("--b = %d \n", --b);
8     printf("++c = %f \n", ++c);
9     printf("--d = %f \n", --d);
10    return 0;
11 }
12
```

input

```
++a = 11
--b = 99
++c = 11.500000
--d = 99.500000

...Program finished with exit code 0
Press ENTER to exit console.
```

2) Type the following code and observe the output to know the working of relational operators

```
#include <stdio.h>

int main()
{
    int a = 5, b = 5, c = 10;
```

```

printf("%d == %d is %d \n", a, b, a == b);
printf("%d == %d is %d \n", a, c, a == c);
printf("%d > %d is %d \n", a, b, a > b);
printf("%d > %d is %d \n", a, c, a > c);
printf("%d < %d is %d \n", a, b, a < b);
printf("%d < %d is %d \n", a, c, a < c);
printf("%d != %d is %d \n", a, b, a != b);
printf("%d != %d is %d \n", a, c, a != c);
printf("%d >= %d is %d \n", a, b, a >= b);
printf("%d >= %d is %d \n", a, c, a >= c);
printf("%d <= %d is %d \n", a, b, a <= b);
printf("%d <= %d is %d \n", a, c, a <= c);

return 0;
}

```

Output:

The screenshot shows a web browser window with the URL `onlinegdb.com/edit/Zg2XJdE-S`. The editor contains the following C code:

```

1 #include <stdio.h>
2 int main()
3 {
4     int a = 5, b = 5, c = 10;
5     printf("%d == %d is %d \n", a, b, a == b);
6     printf("%d == %d is %d \n", a, c, a == c);
7     printf("%d > %d is %d \n", a, b, a > b);
8     printf("%d > %d is %d \n", a, c, a > c);
9     printf("%d < %d is %d \n", a, b, a < b);
10    printf("%d < %d is %d \n", a, c, a < c);

```

The output window shows the following results:

```

5 == 5 is 1
5 == 10 is 0
5 > 5 is 0
5 > 10 is 0
5 < 5 is 0
5 < 10 is 1
5 != 5 is 0
5 != 10 is 1
5 >= 5 is 1
5 >= 10 is 0
5 <= 5 is 1
5 <= 10 is 1

```

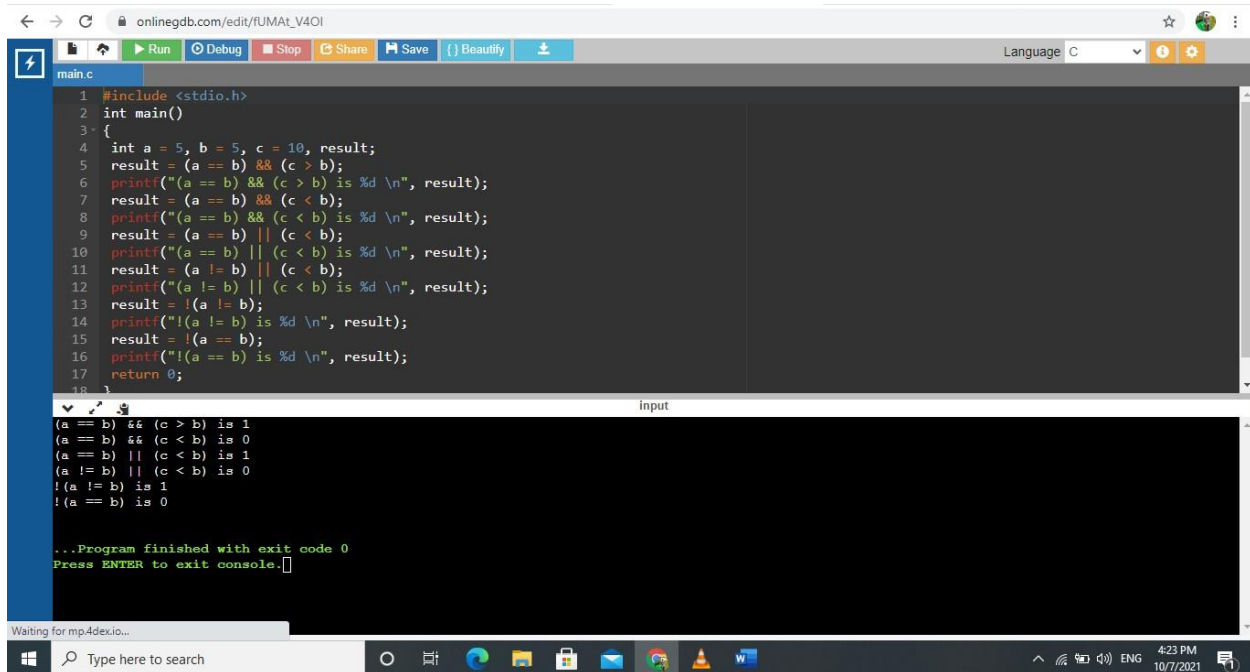
At the bottom, it says: "...Program finished with exit code 0 Press ENTER to exit console."

3) Type the following code and observe the output to know the working of logical operators

```
#include <stdio.h>
```

```
int main()
{
    int a = 5, b = 5, c = 10, result;
    result = (a == b) && (c > b);
    printf("(a == b) && (c > b) is %d \n", result);
    result = (a == b) && (c < b);
    printf("(a == b) && (c < b) is %d \n", result);
    result = (a == b) || (c < b);
    printf("(a == b) || (c < b) is %d \n", result);
    result = (a != b) || (c < b);
    printf("(a != b) || (c < b) is %d \n", result);
    result = !(a != b);
    printf("!(a != b) is %d \n", result);
    result = !(a == b);
    printf("!(a == b) is %d \n", result);
    return 0;
}
```

Output:



The screenshot shows a web browser window with the URL `onlinegdb.com/edit/FUMAt_V4OI`. The browser's address bar and tabs are visible. Below the browser window, there is a toolbar with buttons for Run, Debug, Stop, Share, Save, and Beautify. The main area is divided into two panes. The top pane, titled 'main.c', contains the following C code:

```
1 #include <stdio.h>
2 int main()
3 {
4     int a = 5, b = 5, c = 10, result;
5     result = (a == b) && (c > b);
6     printf("(a == b) && (c > b) is %d \n", result);
7     result = (a == b) && (c < b);
8     printf("(a == b) && (c < b) is %d \n", result);
9     result = (a == b) || (c < b);
10    printf("(a == b) || (c < b) is %d \n", result);
11    result = (a != b) || (c < b);
12    printf("(a != b) || (c < b) is %d \n", result);
13    result = !(a != b);
14    printf("(!(a != b) is %d \n", result);
15    result = !(a == b);
16    printf("(!(a == b) is %d \n", result);
17    return 0;
18 }
```

The bottom pane, titled 'input', shows the output of the program:

```
(a == b) && (c > b) is 1
(a == b) && (c < b) is 0
(a == b) || (c < b) is 1
(a != b) || (c < b) is 0
!(a != b) is 1
!(a == b) is 0

...Program finished with exit code 0
Press ENTER to exit console.
```

At the bottom of the browser window, there is a search bar and a taskbar with various application icons.

4) Write a C program that displays the size of all possible data types in C

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    printf("int is   %2d bytes \n", sizeof(short int));
```

```
    printf("long int is %2d bytes \n", sizeof(long int));
```

```
    printf("float is   %2d bytes \n", sizeof(float));
```

```
    printf("double is  %2d bytes \n", sizeof(double));
```

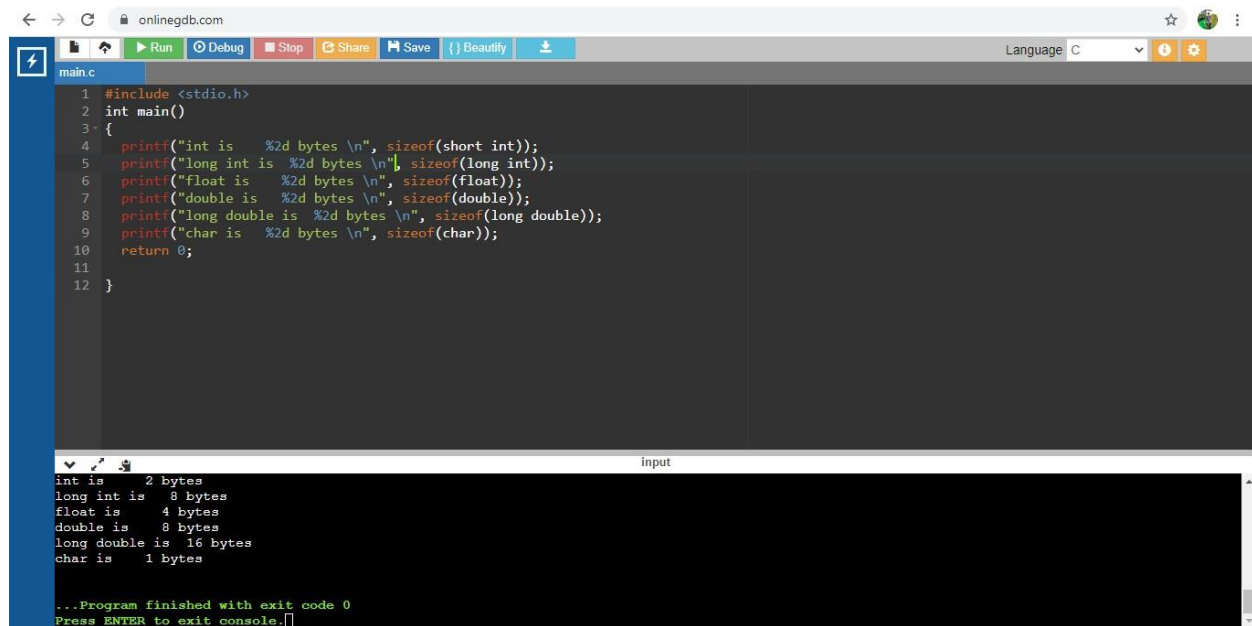
```
    printf("long double is %2d bytes \n", sizeof(long double));
```

```
    printf("char is   %2d bytes \n", sizeof(char));
```

```
    return 0;
```

```
}
```

Output:



```
1 #include <stdio.h>
2 int main()
3 {
4     printf("int is %2d bytes \n", sizeof(short int));
5     printf("long int is %2d bytes \n", sizeof(long int));
6     printf("float is %2d bytes \n", sizeof(float));
7     printf("double is %2d bytes \n", sizeof(double));
8     printf("long double is %2d bytes \n", sizeof(long double));
9     printf("char is %2d bytes \n", sizeof(char));
10    return 0;
11 }
12
```

int is 2 bytes
long int is 8 bytes
float is 4 bytes
double is 8 bytes
long double is 16 bytes
char is 1 bytes

...Program finished with exit code 0
Press ENTER to exit console.

5) Let the variable num=22. Show the working (on paper) of left shift operator on num, i.e. num<<1,num<<2.... Validate the results by writing a program. Repeat the above to see the working of right shift operator as well

num<<1

```
#include <stdio.h>
```

```
int main()
```

```
{
```

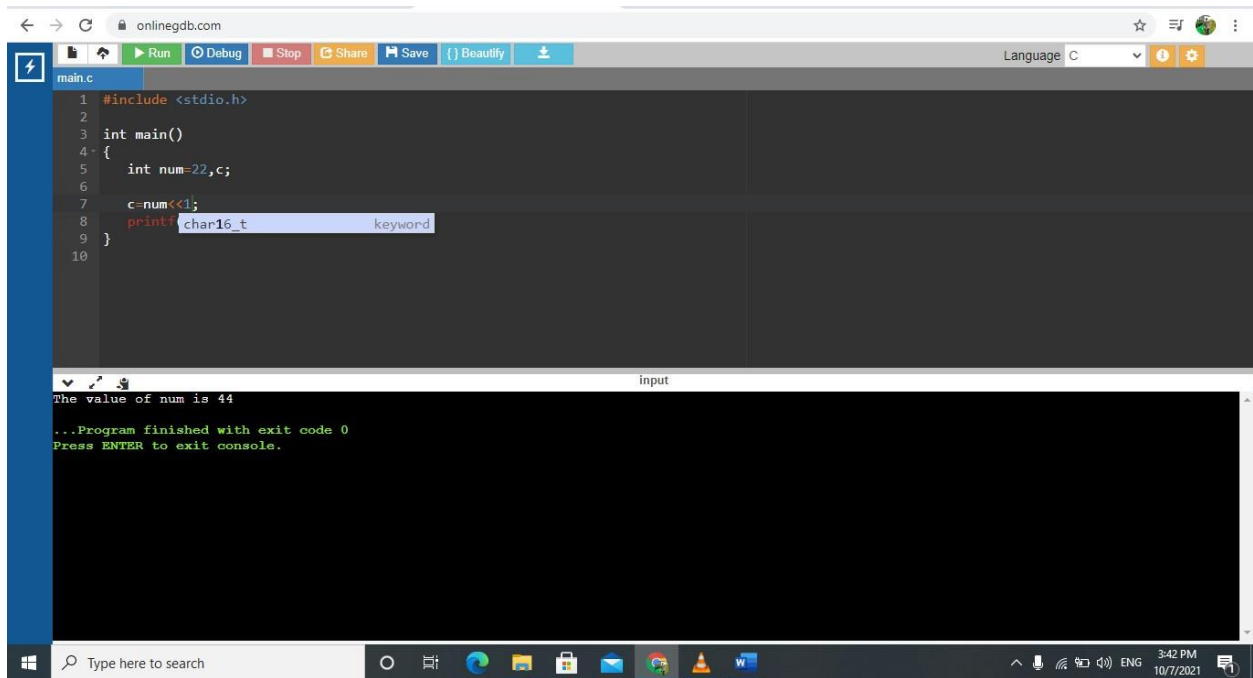
```
    int num=22,c;
```

```
    c=num<<1;
```

```
    printf("The value of num is %d",c);
```

```
}
```

Output:



The screenshot shows a web browser window with the URL `onlinegdb.com`. The browser's address bar and tabs are visible. Below the browser window, there is a Windows taskbar with various icons and the system clock showing 3:42 PM on 10/7/2021.

The main content area displays a C program in a dark-themed editor. The code is as follows:

```
1 #include <stdio.h>
2
3 int main()
4 {
5     int num=22,c;
6
7     c=num<<1;
8     printf("The value of num is %d",c);
9 }
10
```

The output window at the bottom shows the following text:

```
The value of num is 44
...Program finished with exit code 0
Press ENTER to exit console.
```

Num<<2

`#include <stdio.h>`

`int main()`

`{`

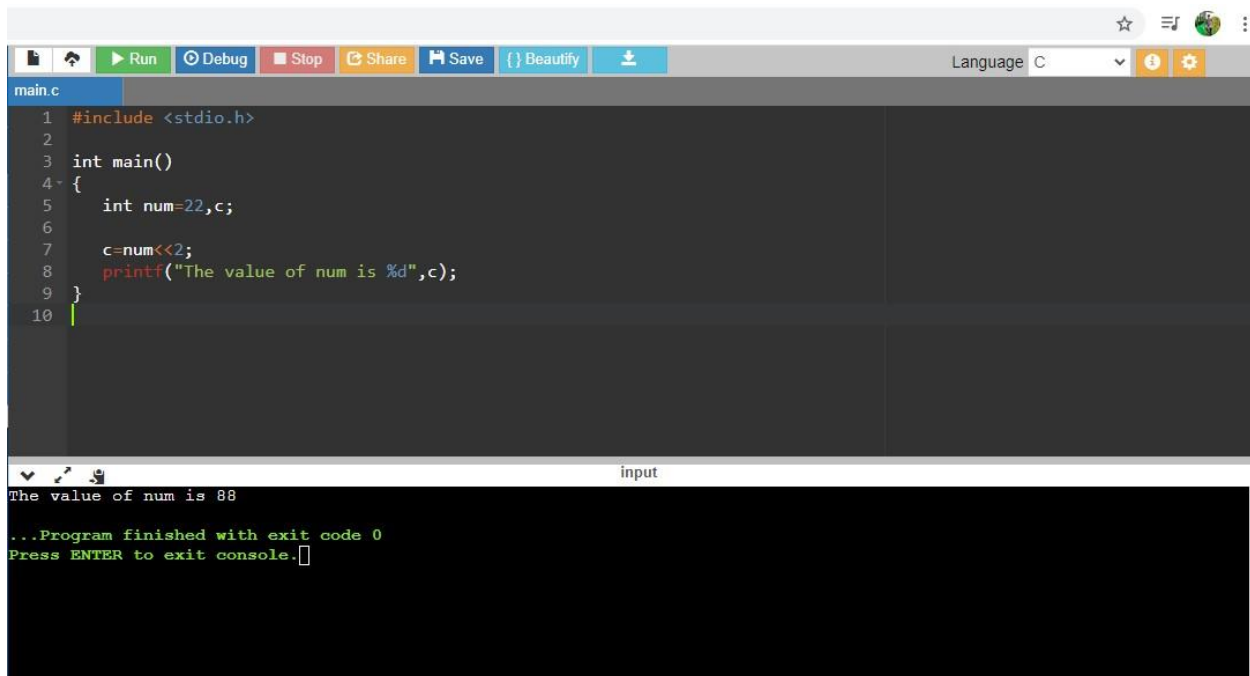
`int num=22,c;`

`c=num<<2;`

`printf("The value of num is %d",c);`

`}`

Output:



```
main.c
1 #include <stdio.h>
2
3 int main()
4 {
5     int num=22,c;
6
7     c=num<<2;
8     printf("The value of num is %d",c);
9 }
10
```

input

The value of num is 88

...Program finished with exit code 0
Press ENTER to exit console.

Num>>1

```
#include <stdio.h>
```

```
int main()
```

```
{
```

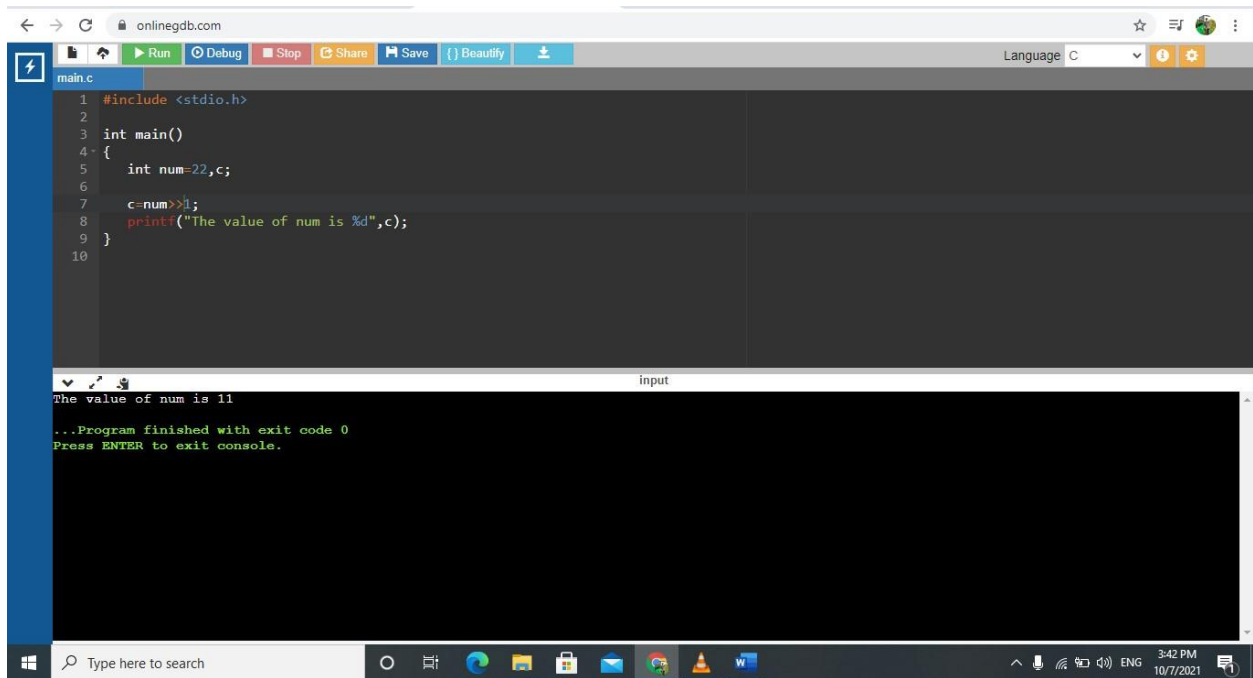
```
    int num=22,c;
```

```
    c=num>>1;
```

```
    printf("The value of num is %d",c);
```

```
}
```

Output:



The screenshot shows a web browser window with the URL `onlinegdb.com`. The browser's address bar and tabs are visible. The main content area displays a C program in a dark-themed editor. The code is as follows:

```
1 #include <stdio.h>
2
3 int main()
4 {
5     int num=22,c;
6
7     c=num>>1;
8     printf("The value of num is %d",c);
9 }
10
```

Below the code editor, there is a console window titled "input". It shows the output of the program:

```
The value of num is 11
...Program finished with exit code 0
Press ENTER to exit console.
```

The Windows taskbar is visible at the bottom of the screen, showing the search bar and various application icons.

Num>>2

```
#include <stdio.h>
```

```
int main()
```

```
{
```

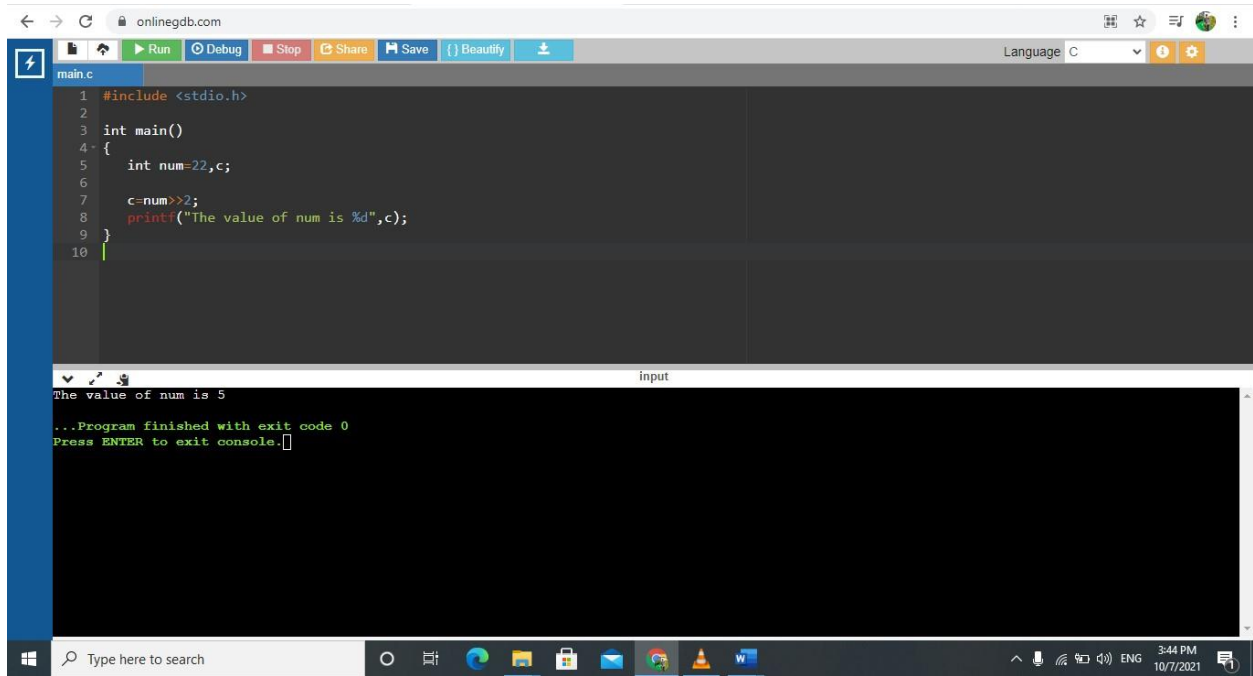
```
    int num=22,c;
```

```
    c=num>>2;
```

```
    printf("The value of num is %d",c);
```

```
}
```

Output:



num = 22

left shift num << 1
~~num << 2~~ num << 2

		64	32	16	8	4	2	1	
22 =>		0	0	1	0	1	1	0	
n << 1 =>		0	1	0	1	1	0	0	=> 44
n << 2 =>		1	0	1	1	0	0	0	=> 88

right shift num >> 1 , num >> 2

		64	32	16	8	4	2	1	
22 =>		0	0	1	0	1	1	0	
num >> 1 =>		0	0	0	1	0	1	1	=> 11
num >> 2 =>		0	0	0	0	1	0	1	=> 5

6)Write a program to determine the largest of two numbers using ternary operator. Enhance the code to determine largest of three numbers. (if statements are not allowed)

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int a, b, large;
```

```
    printf("Enter 2 numbers\n");
```

```
    scanf("%d%d", &a, &b);
```

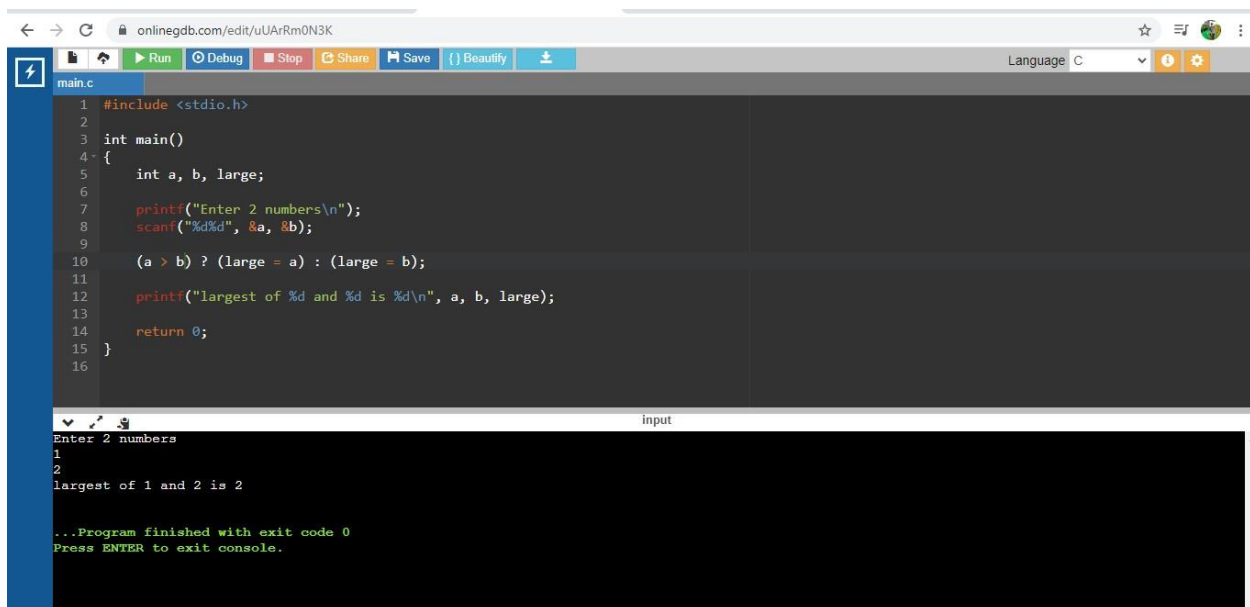
```
    (a > b) ? (large = a) : (large = b);
```

```
    printf("largest of %d and %d is %d\n", a, b, large);
```

```
    return 0;
```

```
}
```

Output:



The screenshot shows a web browser window with the URL `onlinegdb.com/edit/uUARm0N3K`. The browser's address bar and tabs are visible. Below the browser window, there is a code editor with a dark background and a light blue sidebar on the left. The code editor contains the following C code:

```
1 #include <stdio.h>
2
3 int main()
4 {
5     int a, b, large;
6
7     printf("Enter 2 numbers\n");
8     scanf("%d%d", &a, &b);
9
10    (a > b) ? (large = a) : (large = b);
11
12    printf("largest of %d and %d is %d\n", a, b, large);
13
14    return 0;
15 }
16
```

Below the code editor, there is a terminal window with a black background and white text. The terminal shows the output of the program:

```
Enter 2 numbers
1
2
largest of 1 and 2 is 2

...Program finished with exit code 0
Press ENTER to exit console.
```

```
# include <stdio.h>
```

```
void main()
```

```
{
```

```
    int a, b, c, large ;
```

```
    printf("Enter three numbers : ");
```

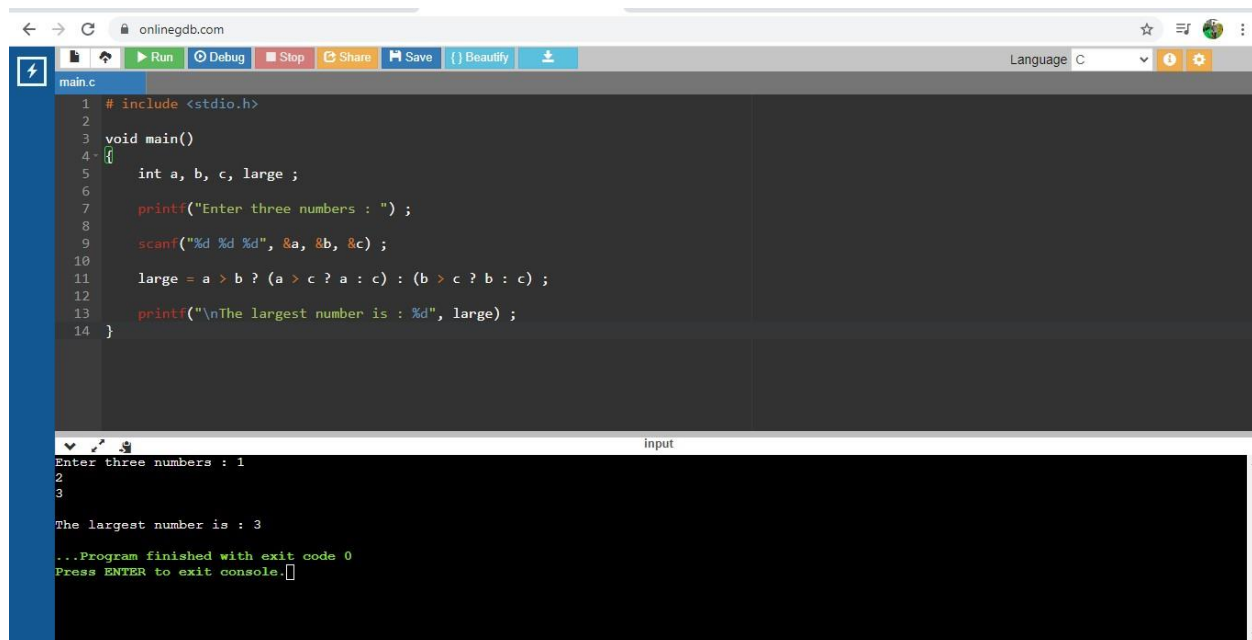
```
    scanf("%d %d %d", &a, &b, &c);
```

```
    large = a > b ? (a > c ? a : c) : (b > c ? b : c);
```

```
    printf("\nThe largest number is : %d", large);
```

```
}
```

Output:



```
1 #include <stdio.h>
2
3 void main()
4 {
5     int a, b, c, large ;
6
7     printf("Enter three numbers : ");
8
9     scanf("%d %d %d", &a, &b, &c);
10
11     large = a > b ? (a > c ? a : c) : (b > c ? b : c);
12
13     printf("\nThe largest number is : %d", large);
14 }
```

Enter three numbers : 1
2
3

The largest number is : 3

...Program finished with exit code 0
Press ENTER to exit console.