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Pointers

Pointers In C

Null Pointer In C

Function Pointer In C

Double Pointer In C

Void Pointer In C

Const Pointer In C

Dangling Pointers In C

Operators

1. floor (double a)

This function returns the largest integer value not greater than 'a' value. It rounds a value and returns a double as a result. It behaves differently for negative numbers, as they round to the next negative number.

Ex: floor (7.2) is 7.0
floor (-7.2) is -8.0

Example:

This program illustrates how to compute the floor for the declared value and rounds to the next value 10.

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

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Dangling Pointers In C

Operators

C Operators

Arithmetic Operators In C

Relational Operators In C

Assignment Operators In C

Logical Operators In C

Conditional Operator In C

Modulus Operator In C

Ternary Operator In C

Address Operator In C

Unary Operator In C

Operators Precedence In C

```
#include <stdio.h>
#include <math.h>
int main()
{
    double f= -9.33;
    int final;
    final = floor(f);
    printf("Floor value of %.2f = %d", f, final);
    return 0;
}
```

Output:

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Address Operator In C

Unary Operator In C

Operators Precedence In C

Left Shift Operator In C

Control Statement

```
#include <math.h>
int main()
{
    double f= -9.33;
    int final;
    final = floor(f);
    printf("Floor value of %.2f = %d", f, final);
    return 0;
}
```

Output:

Floor value of -9.33 = -10

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Control Statement

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Else If Statement In C

Nested If Statement In C

#Else In C

Structure Padding In C

Nested Structure In C

Continue Statement In C

Break Statement In C

Switch Statement In C

Goto Statement In C

2. ceil ()

Syntax:

```
double ceil (double b)
```

This function returns the smallest integer value that is greater or equal to b and rounds the value upwards. For a negative value, it moves towards the left. Example 3.4 returns -3 has the output.

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Example:

This program explains by taking input in the float argument and returns the ceil value.

```
#include <stdio.h>
#include <math.h>
int main()
{
    float n, ceilVal;
    printf(" Enter any Numeric element : ");
    scanf("%f", &n);
    ceilVal = ceil(n);
    printf("\n The Value of %.2f = %.4f ", n, ceilVal);
    return 0;
}
```

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```
{  
float n, ceilVal;  
printf(" Enter any Numeric element : ");  
scanf("%f", &n);  
ceilVal = ceil(n);  
printf("\n The Value of %.2f = %.4f ", n, ceilVal);  
return 0;  
}
```

Output:

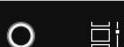
Enter any Numeric element : 12.6

The Value of 12.60 = 13.0000

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3. Sqrt ()

This function returns the square root of a specified number.

Syntax:

```
sqrt( arg)
```

Example:

The below code explains the most known mathematical function sqrt() by taking 'n' values to compute the square root for the different 'n' values.

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

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```
#include <math.h>
int main()
{
    double n,output;
    printf("Enter a number\n");
    scanf("%lf", &n);
    output = sqrt(n);
    printf("Square root of %.2lf = %f", n,output);
    return 0;
```

Output:

```
Enter a number
4
Square root of 4.00 = 2.000000
```

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5.pow ()

This function returns to power for the given number(a^b). It returns a raised to the power of b, which has two parameters base and exponent.

Example:

In the Below source code, we are allowing a user to enter an input value to compute the power of the given two arguments.

```
#include <stdio.h>
#include <math.h>
int main()
{
    int r, ba, expr;
```

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```
#include <stdio.h>
#include <math.h>
int main()
{
    int r, ba, expr;
    printf("\n Enter the Base and Exponent numbers : \n");
    scanf("%d %d", &ba, &expr);
    r = pow(ba, expr);
    printf("\n The result of %d Power %d = %d ", ba, expr ,r);
    return 0;
}
```

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output:



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```
int r, ba, expr;  
printf("\n Enter the Base and Exponent numbers : \n");  
scanf("%d %d", &ba, &expr);  
r = pow(ba, expr);  
printf("\n The result of %d Power %d = %d ", ba, expr ,r);  
return 0;  
}
```

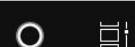
output:

```
Enter the Base and Exponent numbers :  
5 3  
  
The result of 5 Power 3 = 125
```

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7. fmod()

This function returns the remainder for the given two input values when m divided by n.

Syntax:

```
double fmod(double I, double j)
```

Example:

In the below example it takes two values from the user to compute the remainder using fmod() function.

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

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In the below example it takes two values from the user to compute the remainder using fmod() function.

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

int main(){
    double fiN;
    double secN;
    double n;
    printf("Enter the first number : ");
    scanf("%lf",&fiN);
    printf("Enter the second number : ");
    scanf("%lf",&secN);
```

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```
double secN;
double n;
printf("Enter the first number : ");
scanf("%lf",&fiN);
printf("Enter the second number : ");
scanf("%lf",&secN);
printf("fmod(firstNumber,secondNumber) is %lf \n",fmod(fiN,secN));
}
```

Output:

```
Enter the first number : 10
Enter the second number : 3
fmod(firstNumber,secondNumber) is 1.000000
```

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1. sin()

This built-in function gives sine value of the given number, calculates floating-point values. asin() computes arc, for hyperbolic it is sinh().

Syntax:

```
return type sin(y);
```

y returns value in radians and return type takes double.

Example:

In the following source code, I have taken two different input values to calculate sin value and returns double.

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```
#include <stdio.h>
#include <math.h>
int main()
{
    double a;
    double z;
    a = 4.3;
    z = sin(a);
    printf("sin(%.2lf) = %.2lf\n", a, z);
    a = -4.3;
    z = sin(a);
    printf("sin(%.2lf) = %.2lf\n", a, z);
    a = 45;
```

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```
printf("sin(%.2lf) = %.2lf\n", a, z);
a = -4.3;
z = sin(a);
printf("sin(%.2lf) = %.2lf\n", a, z);
a = 45;
z = sin(a);
printf("sin(%.2lf) = %.2lf\n", a, z);
return 0;
}
```

Output:

```
sin(4.30) = -0.92
sin(-4.30) = 0.92
sin(45.00) = 0.85
```

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3. cos()

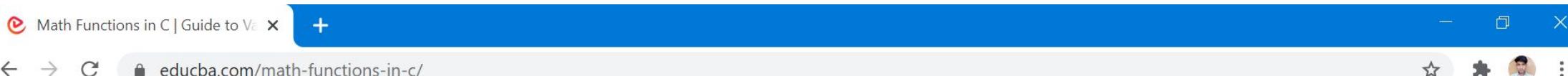
This math function determines the trigonometric cosine value for the given element.

Syntax:

```
return type cos(argument);
```

```
#include <stdio.h>
#include <math.h>
#define PI 3.14
int main()
{
    double cVal, rVal, dVal;
```

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```
int main()
{
    double cVal, rVal, dVal;
    for(int i=0;i<=2;i++)
    {
        printf(" Enter an Angle in degrees : ");
        scanf("%lf", &dVal);
        rVal = dVal * (PI/180);
        cVal = cos(rVal);
        printf("\n The Cosine value of %f = %f ", dVal, cVal);
        printf("\n");
    }
    return 0;
}
```

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```
printf("\n The Cosine value of %f = %f", avar, cvar);
printf("\n");
}
return 0;
}
```

Output:

```
Enter an Angle in degrees : 30
The Cosine value of 30.000000 = 0.866158
Enter an Angle in degrees : 45
The Cosine value of 45.000000 = 0.707388
Enter an Angle in degrees : 90
The Cosine value of 90.000000 = 0.000796
```

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1. exp()

This function does computation on exponential for a given value(e^x). There are also other subtypes like frexp(), ldexp() returning mantissa and multiplied to the power of x.

Syntax:

```
return type exp(value);
```

Example:

The program takes numeric value from the user to compute the exponent for a given value and returns double.

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```
#include <stdio.h>
#include <math.h>
int main()
{
    double numb, eVal;
    printf(" Enter any Numeric Value : ");
    scanf("%lf", &numb);
    eVal = exp(numb);
    printf("\n Exponential Value of e power %lf = %lf ", numb, eVal);
    printf("\n");
    return 0;
}
```

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```
double numb, eVal;  
printf(" Enter any Numeric Value : ");  
scanf("%lf", &numb);  
eVal = exp(numb);  
printf("\n Exponential Value of e power %lf = %lf ", numb, eVal);  
printf("\n");  
return 0;  
}
```

Output

```
Enter any Numeric Value : 6  
Exponential Value of e power 6.000000 = 403.428793
```

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2. log()

This function returns the logarithm value of a given number. (to the base e. \log_e)

Syntax:

```
double log(arg);
```

Example:

In the following example, log value for the given number is calculated using function. User-defined function lgm() does computation and function is called in the main function.

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

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```
#include<stdio.h>
#include<math.h>
float lgm ( float iv );
int main ()
{
    float q, r ;
    printf ( "\nEnter a number to find log value \n");
    scanf ( "%f", &q ) ;
    r = lgm ( q ) ;
    printf ( "\nthe log value is %f is %f",q,r );
}
float lgm ( float iv ) // function definition
{
    float exe ;
```

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```
{  
float q, r ;  
printf ( "\nEnter a number to find log value \n");  
scanf ( "%f", &q ) ;  
r = lgm ( q ) ;  
printf ( "\nthe log value is %f is %f",q,r );  
}  
float lgm ( float iv ) // function definition  
{  
float exe ;  
exe = log(iv);  
return ( exe ) ;  
}
```

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```
    }
float lgm ( float iv ) // function definition
{
    float exe ;
    exe = log(iv);
    return ( exe ) ;
}
```

output:

```
Enter a number to find log value
1

the log value is 1.000000 is 0.000000
```

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- C Library - <locale.h>
- C Library - <math.h> (selected)
- C Library - <setjmp.h>

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Description

The C library function **double modf(double x, double *integer)** returns the fraction component (part after the decimal), and sets integer to the integer component.

Declaration

Following is the declaration for modf() function.

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Declaration

Following is the declaration for modf() function.

```
double modf(double x, double *integer)
```

Parameters

- x – This is the floating point value.
- integer – This is the pointer to an object where the integral part is to be stored.

Return Value

This function returns the fractional part of x, with the same sign.

Example

The following example shows the usage of modf() function.

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

int main () {
    double x, fractpart, intpart;
```

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Example

The following example shows the usage of modf() function.

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

int main () {
    double x, fractpart, intpart;

    x = 8.123456;
    fractpart = modf(x, &intpart);

    printf("Integral part = %lf\n", intpart);
    printf("Fraction Part = %lf \n", fractpart);

    return(0);
}
```

Live Demo

Let us compile and run the above program that will produce the following result –

```
Integral part = 8.000000
Fraction Part = 0.123456
```

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C fabs()

The fabs() function returns the absolute value of a number.

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Function Prototype of fabs()

```
double fabs (double x);
```

The fabs() function takes a single argument (in `double`) and returns

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- atan2()
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- cos()
- cosh()
- exp()
- fabs()**
- floor()
- hypot()
- log()
- log10()

Function Prototype of fabs()

```
double fabs (double x);
```

The fabs() function takes a single argument (in `double`) and returns the absolute value of that number (also in `double`).

[Mathematics] $|x| = \text{fabs}(x)$ [In C programming]

To find absolute value of an integer or a float, you can explicitly convert the number to double.

```
int x = 0;
double result;
result = fabs(double(x));
```

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The fabs() function is defined in [math.h](#) header file

Example: C fabs() function

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

int main()
{
    double x, result;

    x = -1.5;
```

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

int main()
{
    double x, result;

    x = -1.5;
    result = fabs(x);
    printf("|%.2lf| = %.2lf\n", x, result);

    x = 11.3;
    result = fabs(x);
    printf("|%.2lf| = %.2lf\n", x, result);

    x = 0;
    result = fabs(x);
    printf("|%.2lf| = %.2lf\n", x, result);

    return 0;
}
```



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```
x = -1.5;
result = fabs(x);
printf("|%.2lf| = %.2lf\n", x, result);

x = 11.3;
result = fabs(x);
printf("|%.2lf| = %.2lf\n", x, result);

x = 0;
result = fabs(x);
printf("|%.2lf| = %.2lf\n", x, result);

return 0;

}
```

Output

```
| -1.50 | = 1.50
| 11.30 | = 11.30
| 0.00 | = 0.00
```

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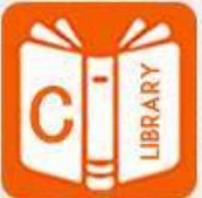
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Description

The C library function **div_t div(int numer, int denom)** divides **numer (numerator)**

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Description

The C library function `div_t div(int numer, int denom)` divides **numer** (**numerator**) by **denom** (**denominator**).

Declaration

Following is the declaration for `div()` function.

```
div_t div(int numer, int denom)
```

Parameters

- numer** – This is the numerator.
- denom** – This is the denominator.

Return Value

This function returns the value in a structure defined in `<cstdlib>`, which has two members. For `div_t: int quot; int rem;`

Example

The following example shows the usage of `div()` function.



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The following example shows the usage of div() function.

#include <stdio.h>
#include <stdlib.h>

```
int main () {  
    div_t output;  
  
    output = div(27, 4);  
    printf("Quotient part of (27/ 4) = %d\n", output.quot);  
    printf("Remainder part of (27/4) = %d\n", output.rem);  
  
    output = div(27, 3);  
    printf("Quotient part of (27/ 3) = %d\n", output.quot);  
    printf("Remainder part of (27/3) = %d\n", output.rem);  
  
    return(0);  
}
```

Live Demo

Let us compile and run the above program that will produce the following result –

Quotient part of (27/ 4) = 6
Remainder part of (27/4) = 3
Quotient part of (27/ 3) = 9
Remainder part of (27/3) = 0

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C library function - acos()

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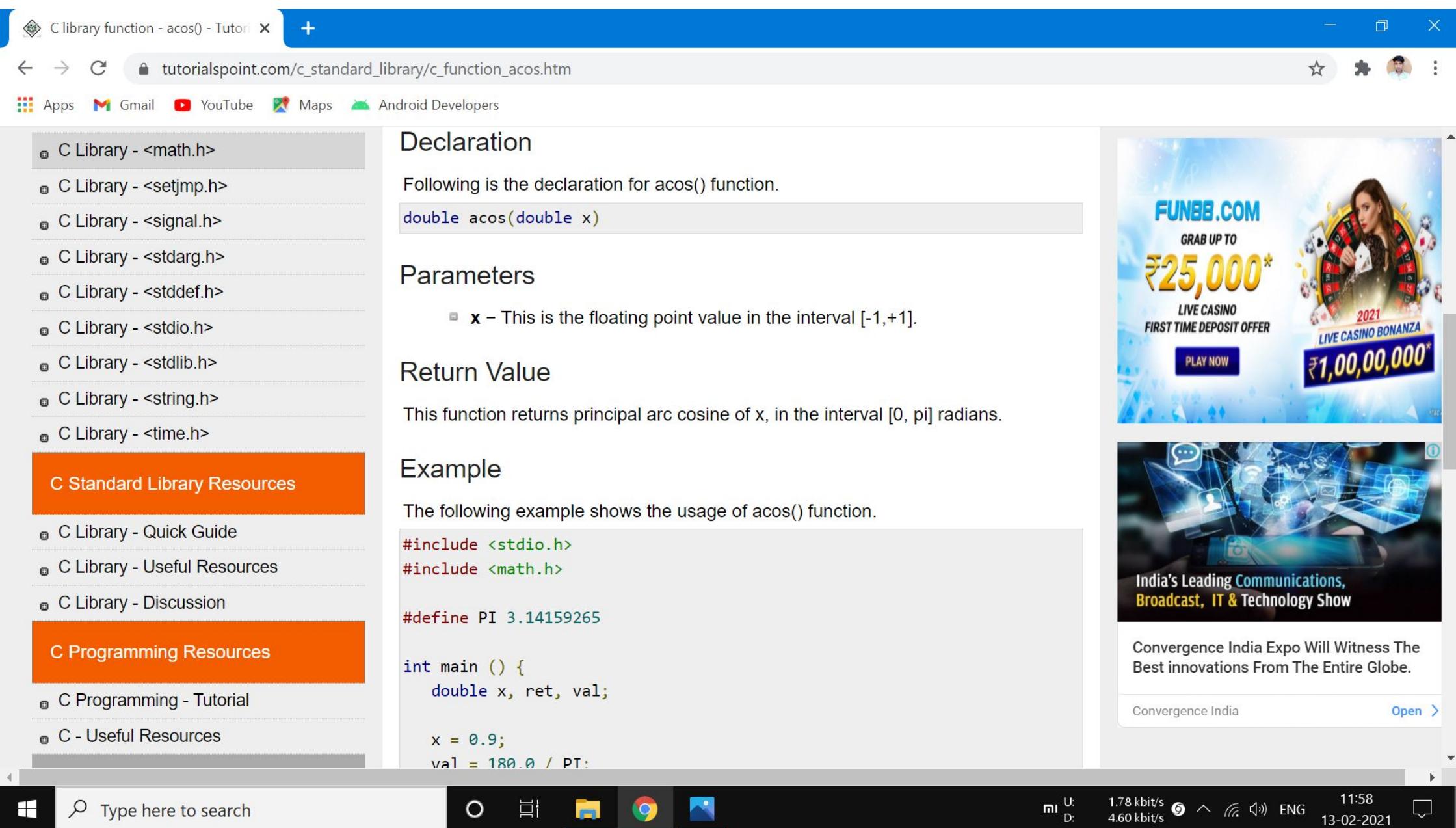
The C library function **double acos(double x)** returns the arc cosine of **x** in radians.

Declaration

Following is the declaration for acos() function.

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This function returns principal arc cosine of x, in the interval [0, pi] radians.

Example

The following example shows the usage of acos() function.

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

#define PI 3.14159265

int main () {
    double x, ret, val;

    x = 0.9;
    val = 180.0 / PI;

    ret = acos(x) * val;
    printf("The arc cosine of %lf is %lf degrees", x, ret);

    return(0);
}
```

Let us compile and run the above program that will produce the following result –

The arc cosine of 0.900000 is 25.855040 degrees

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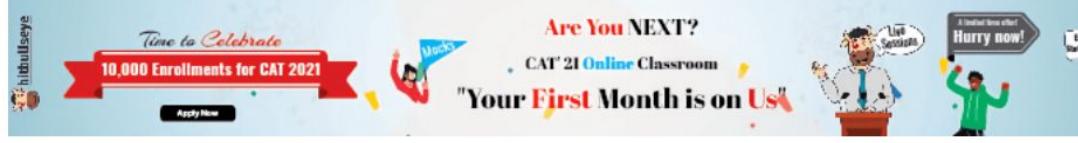
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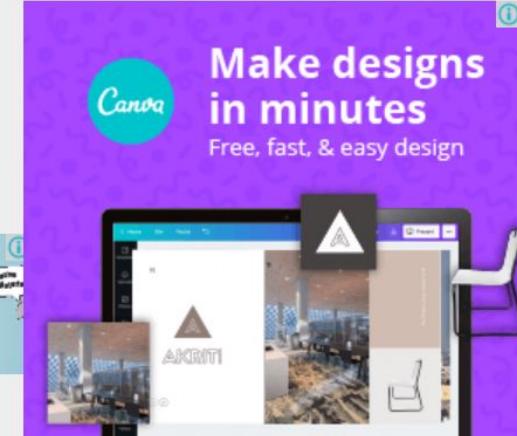
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C library function - asin()

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Description

The C library function **double asin(double x)** returns the arc sine of **x** in radians.

Declaration

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Description

The C library function **double asin(double x)** returns the arc sine of **x** in radians.

Declaration

Following is the declaration for asin() function.

```
double asin(double x)
```

Parameters

- x** – This is the floating point value in the interval [-1,+1].

Return Value

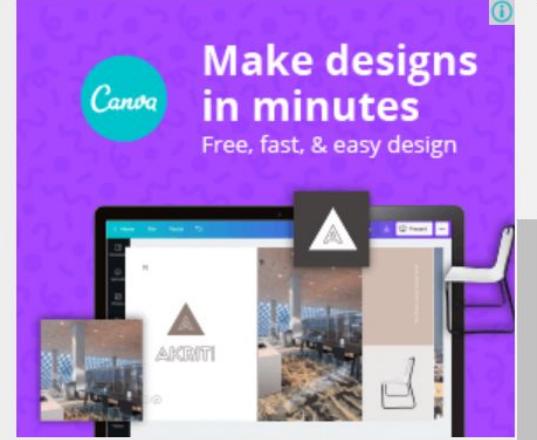
This function returns the arc sine of **x**, in the interval [-pi/2,+pi/2] radians.

Example

The following example shows the usage of asin() function.

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

#define PI 3.14159265
```



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Return value

This function returns the arc sine of x, in the interval [-pi/2,+pi/2] radians.

Example

The following example shows the usage of asin() function.

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

#define PI 3.14159265

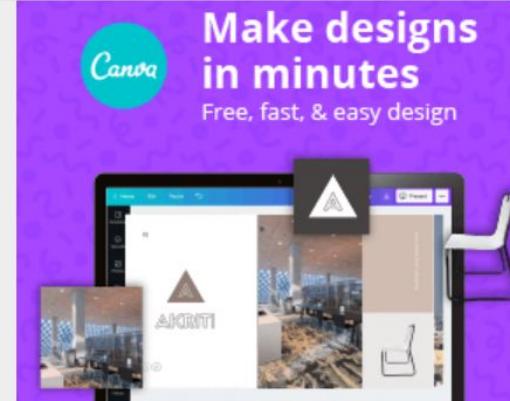
int main () {
    double x, ret, val;
    x = 0.9;
    val = 180.0 / PI;

    ret = asin(x) * val;
    printf("The arc sine of %lf is %lf degrees", x, ret);

    return(0);
}
```

Let us compile and run the above program that will produce the following result –

The arc sine of 0.900000 is 64.158067 degrees



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Description

The C library function **double atan(double x)** returns the arc tangent of **x** in radians.

Declaration

Following is the declaration for atan() function.

```
double atan(double x)
```

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Description

The C library function **double atan(double x)** returns the arc tangent of **x** in radians.

Declaration

Following is the declaration for atan() function.

```
double atan(double x)
```

Parameters

- x** – This is the floating point value.

Return Value

This function returns the principal arc tangent of **x**, in the interval $[-\pi/2, +\pi/2]$ radians.

Example

The following example shows the usage of atan() function.



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radians.

Example

The following example shows the usage of atan() function.

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

#define PI 3.14159265

int main () {
    double x, ret, val;
    x = 1.0;
    val = 180.0 / PI;

    ret = atan (x) * val;
    printf("The arc tangent of %lf is %lf degrees", x, ret);

    return(0);
}
```

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Let us compile and run the above program that will produce the following result –

The arc tangent of 1.000000 is 45.000000 degrees



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