Math. Functions

pow (real) <math.h>

Power function, x to the y
Declaration:

double pow(double x, double y);

Q) Write a program to calculate the cubic number for 4 different numbers

```
#include <iostream.h>
#include <conio.h>
#include <math.h>
int main()
{
double n,c;
clrscr();

  for (int i=1;i<=4;i=i+1)
    {
     cout <<"Number:=";
     cin>> n;
     c=pow(n,3);
    cout <<"Cubic Number:="<<c;
    }
cout << "\n\nHit any key to continue";
getch();
return 0;
}
```

cos, sin, tan (real) <math.h>

Cosine, sine, and tangent functions

Declaration:

double cos(double x);
double sin(double x);
double tan(double x);

Remarks:

- cos compute the cosine of the input value
- sin compute the sine of the input value
- tan calculate the tangent of the input value

Angles are specified in radians.

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

int main(void)
{
   double result, x;

   x = 90;
   result = sin(x*3.14/180);
   cout <<"The sin of "<<x<<" is "<< result;
//the oputput is: The sin of 90.00 is 1.00
   return 0;
}
```

acos, asin, atan, atan2 (real) <math.h>

Arc cosine, arc sine, and arc tangent functions

Declaration:

double acos(double x);
double asin(double x);
double atan(double x);
double atan2(double y, double x);

Remarks:

- acos of a real value compute the arc cosine of that value
- asin of a real value compute the arc sine of that value
- atan calculate the arc tangent of the input value
- atan2 also calculate the arc tangent of the input value

Real arguments to acos, and asin must be in the range -1 to 1.

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

int main(void)
{
   double result;
   double x = 1.00;

   result = asin(x)/(3.14/180);
  cout <<"The arc sin of "<<x<<" is "<< result;
//the oputput is: The arc sin of 1.00 is 90.00

   return(0);
}
```

exp (real) <math.h>

- Real exp calculates e to the xth power

Declaration:

double exp(double x);

Remarks:

exp calculates the exponential function e**x.

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

int main(void)
{
   double result;
   double x = 4.0;

   result = exp(x);
cout <<" 'e' raised to the power of "<<x<<" (e ^ "<<x<<") = "<< result;
      return 0;
}
The output is: 'e' raised to the power of 4.000000e^4.000000)=54.598150
```

sqrt (real) < math.h >

Calculates square root

Declaration:
- Real: double sqrt(double x);
  long double sqrtl(long double @E(x));

Remarks:
sqrt calculates the positive square root of the input value.

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

 int main(void)
 {
   double x = 4.0, result;

   result = sqrt(x);
   cout <<"The square root of  "<<x<<" is "<< result;
   //the oputput is: The square root of 4.000000 is 2.000000
         return 0;
}
```

abs <math.h, stdlib.h, complex.h>
fabs < math.h >
labs < math.h, stdlib.h >

- abs (a macro) gets the absolute value of an integer
- fabs calculate the absolute value of a floating-point number
- labs calculates the absolute value of a long number

Declaration:
- abs
  int abs(int x);
- double fabs(double x);
- long int labs(long int x);

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

int main(void)
{
  int number = -1234;

  cout <<"number: "<<number<<" absolute value: " << abs(number);
  //the oputput is: number: -1234 absolute value: 1234
  return 0;
}
```

randomize <stdlib.h>

Initializes random number generator. time.h must included

random < stdlib.h >

Returns a random number: random(num);
random returns a random number between 0 and (num-1).

```
#include <stdlib.h>
#include <iostream.h>
#include <time.h>
/* prints a random number in the range 0 to 99 */
int main(void)
{
   randomize();
   cout <<"Random number in the 0-99 range: "<< random (100);
   return 0;
}
```

Q) Write a program to solve the following equations, where Q in degree

$$y = \begin{cases} |\tan Q - e^{Q}| & x < 0 \\ \dfrac{-b + \sqrt{b^2 - 4ac}}{2a} & x \geq 0 \end{cases}$$

```
#include <iostream.h>
#include <conio.h>
#include <math.h>
int main()
{
 double y,x,a,b,c,Q;
 clrscr();
 cout <<"x="; cin >>x;
 if (x<0)
 {
   cout <<"Q="; cin >>Q;
   y=fabs(tan(Q*3.14/180)-exp(Q));
 }
 else
 {
  cout <<"a="; cin >>a;
  cout <<"b="; cin >>b;
  cout <<"c="; cin >>c;
  double bs=b*b-4*a*c;
  if ((a) && (bs>0))
   y=(-b+sqrt(bs))/2*a;
  else
   {
    cout <<"Error illegal values";
    getch();
    return 1;
   }
 }
 cout <<"y="<<y;
 getch();
 return 0;
}
```