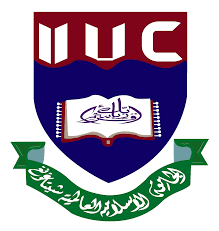
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**Department of Computer Science and Engineering**

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**Course Code : CSE- 4746**

**Course Title : Numerical Methods Lab**

**Submitted By:**

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**Semester : 7TH**

**Matric ID : C201016**

**Section : 7AM**

**Date of Submission : 30 July 2023.**

**Submitted To:**

**Prof. Mohammed Shamsul Alam**

**Professor**

**Dept. Of CSE, IIUC**

* **Write a program to count number of significant digits in a given number.**

**Source Code:**

*#include*<bits/stdc++.h>

*using* *namespace* std;

bool check\_integer(string s)

{

*for*(int i*=*0;i*<*s.size();i*++*)

    {

*if*(s*[*i*]==*'.')*return* 0;

    }

*return* 1;

}

int main()

{

    int sum *=* 0,sum1 *=* 0;

    int f *=* 1 , c *=* 1;

    string s;

    cin*>>*s;

*if*(check\_integer(s))

    {

*for*(int i*=*s.size();i*>=*0;i*--*)

        {

*if*(s*[*i*]>*'0') c *=* 0;

*if*(*!*c)sum*++*;

        }

        cout*<<*sum*<<*endl;

    }

*else*{

*for*( int i*=*0;i*<*s.size();i*++*)

        {

*if*(s*[*i*]==*'.')f *=* 0;

*else* *if*(f *&&* s*[*i*]>*'0')sum*++*;

*else* *if*(f *&&* s*[*i*]==*'0'*&&*sum*>*0)sum*++*;

*else* *if*(*!*f *&&* sum*>*0)sum*++*;

*else* *if*(*!*f *&&* sum*==*0 *&&* s*[*i*]!=*'0')sum1*++*;

*else* *if*(*!*f *&&* sum*==*0 *&&* sum1*>*0)sum1*++*;

        }

        cout*<<*sum*+*sum1*<<*endl;

    }

*return* 0;

}

* **Write a program to round off a number with n significant figures using banker’s rule.**

**Source Code:**

*// bijoy*

*// id:c201016*

*// Write a program to round off a number with n digits after the decimal point using the banker’s rule*

*#include* <bits/stdc++.h>

*using* *namespace* std;

int main()

{

  string number;

  string output *=* "";

  int n, count, m;

  cout *<<* "enter the number: ";

  getline(cin, number);

  m *=* number.size();

  cout *<<* "enter the n: ";

  cin *>>* n;

  count *=* 0;

*for* (int i *=* 0; i *<* m; i*++*)

  {

*if* (count *==* n *+* 1)

    {

*if* ((number*[*i *+* 1*]* *-* '0') *>* 5)

      {

        output *+=* (number*[*i*]* *+* 1);

        cout *<<* "a";

*break*;

      }

*else* *if* ((number*[*i *+* 1*]* *-* '0') *<* 5)

      {

        output *+=* number*[*i*]*;

*break*;

      }

*else* *if* ((number*[*i *+* 1*]* *-* '0') *==* 5)

      {

*if* ((number*[*i*]* *-* '0') *%* 2 *==* 0)

        {

          output *+=* number*[*i*]*;

        }

*else*

          output *+=* (number*[*i*]* *+* 1);

*break*;

      }

*else*

      {

        output *+=* number*[*i*]*;

      }

    }

*else*

    {

      output *+=* number*[*i*]*;

    }

    count*++*;

  }

  cout *<<* "Output: " *<<* output *<<* endl;

*return* 0;

}

* **Write a program to evaluate a polynomial f(x) = x 3 - 2x 2 + 5x + 10 by using Horner’s rule x = 5.**

**Source code:**

*#include* <bits/stdc++.h>

*using* *namespace* std;

int main()

{

  int poly[] *=* {1, *-*2, 5, 10};

  int x *=* 5;

  int n *=* *sizeof*(poly) */* *sizeof*(poly[0]);

  int result *=* poly[0];

*for* (int i *=* 1; i *<* n; i*++*)

  {

    result *=* result *\** x *+* poly[i];

  }

  cout *<<* "polynomial is " *<<* result *<<* endl;

}

* **Write a program to find the root of the equation x2 – 9x + 1 = 0, correct to 3 decimal places, by using the bisection method.**

**Source Code:**

*// id:c201016*

*// Write a program to find the root of the equation x3 – 9x + 1 = 0, correct to 3 decimal places, by using the bisection method.*

*#include*<bits/stdc++.h>

*using* *namespace* std;

double fun(double a){

*return* a*\**a*\**a*-*9*\**a*+*1;

}

void bisection(double a, double b)

{

*if*((fun(a)*\**fun(b))*>*0){

        cout*<<*"it is not possible for these value"*<<*endl;

    }

    double c *=* a;

*while*((b*-*a)*>=*0.001)

    {

        c*=*(a*+*b)*/*2;

*if*(fun(c)*==*0.0)

*break*;

*if*(fun(c)*\** fun(a)*>*0)

        a*=*c;

*else*

        b*=*c;

    }

    cout*<<*"the root is "*<<*c;

}

int main()

{

    double a *=*0, b *=* 1;

    bisection(a,b);

}

* **Write a program to find the root of the equation x5 + 3x2 - 10 = 0, correct to 3 decimal places, by the using fixed point method.**

**Source Code:**

*#include*<bits/stdc++.h>

*using* *namespace* std;

*#define* E 0.0001;

*#define* f(x) ((x*\**x*\**x*\**x*\**x)*+*(3*\**(x*\**x))*-*10)

*#define* g(x) (sqrt(10*/*(pow(x,3.0)*+*3)))

int main()

{

    double x0,x1;

    x0*=*0.5;

*while*(1){

       x1*=* g(x0);

       double error*=*x1*-*x0;

*if*(fabs(error)*<*0.001)

       {

        cout*<<*"the root is "*<<*x1*<<*endl;

*break*;

       }

*else*

       x0*=*x1;

    }

}

* **Write a program to find the root of the equation x3 - 6x + 4 = 0, correct to 3 decimal places, by using Newton-Raphson method.**

**Source Code:**

*#include*<bits/stdc++.h>

*using* *namespace* std;

*#define* E 0.0001;

*#define* f(x) (pow(x,3)*-*6*\**x*+*4)

*#define* ff(x) ((3*\**pow(x,2))*-*6)

int main()

{

    double x0,x1;

    x0*=*0.5;

*do*{

    double ff\_0*=*ff(x0);

    double f\_0*=*f(x0);

    x1*=*(x0*-*(f\_0*/*ff\_0));

*if*(fabs(x1*-*x0)*<*0.001)

    {

        cout*<<*"the root is "*<<*x1*<<*endl;

*break*;

    }

*else*

    x0*=*x1;

}*while* (1);}

* **Write a program to find the root of the equation x 3 - x + 2 = 0, correct to 3 decimal places, by using false position method.**

**Source Code**

* **Write a program to find the root of the equation x 3 – 5x2 –29 = 0, correct to 3 decimal places, by using secant method.**

**Source Code:**

*#include*<bits/stdc++.h>

*using* *namespace* std;

*#define* E 0.0001;

*#define* f(x) (pow(x,3)*-*(5*\**pow(x,2))*-*29)

*#define* ff(x) ((3*\**pow(x,2))*-*6)

int main()

{

    double x0*=*4;

    double x1*=*2;

*do*{

    double f\_x0*=* f(x0);

    double f\_x1 *=* f(x1);

    double x2*=* (x1*-*(((x1*-*x0)*\**f\_x1)*/*(f\_x1*-*f\_x0)));

*if*(fabs(x2*-*x1)*<*0.0001)

    {

        cout*<<*"the root is "*<<*x2*<<*endl;

*break*;

    }

*else*

    x0*=*x1;

    x1*=*x2;

}*while* (1);

}

* **Write a program to find the quotient polynomial q(x) such that p(x) = (x - 2) q(x) where the polynomial p(x) = x3 - 5x2 + 10x - 8 = 0 has a root at x = 2.**

**Source Code:**

* **Write a program to find all the roots of the equation x3 - 6x + 4 = 0, correct to 3 decimal places.**

**Source Code:**