```
Coul << "Root = " << A[i];
return 0;
}
```

# Secant Method:

$f(x) = x^3 - 10x + 1$

formula = $x_{i-1} - \frac{x_{i-1} - x_{i-2}}{f(x_{i-1}) - f(x_{i-2})} * f(x_{i-1})$

## Guess Values:

| x | f(x) | x | f(x) | x | f(x) |
|---|---|---|---|---|---|
| -10 | -899 | -3 | 4 | 4 | 25 |
| -9 | -638 | -2 | 13 | 5 | 76 |
| -8 | -431 | -1 | 16 | 6 | 157 |
| -7 | -272 | 0 | 9 | 7 | 274 |
| -6 | -155 | 1 | -8 | 8 | 433 |
| -5 | -74 | 2 | -11 | 9 | 640 |
| -4 | -23 | 3 | -2 | 10 | 901 |

We use Guess value (0, 1)

$x_0 = 0$

$x_1 = 1$.

We want to find $x_2 = ?$

"$i = 2$" put $i = 2$ in formula

$$x_2 = x_1 - \frac{x_1 - x_0}{f(x_1) - f(x_0)} * f(x_1) \quad \text{---(1)}$$

$f(x_0) = (0)^3 - 10(0) + 1$

$= 1$

$f(x_1) = (1)^3 - 10(1) + 1$

$= -8$

Putting value of $x_1$, $x_0$, $f(x_1)$ $f(x_0)$ in equation (i)

$$x_2 = 1 - \left(\frac{1-0}{(-8-1)}\right) * (-8)$$

$$1 - \left(\frac{-1}{9}\right) * (-8)$$

$$1 - \left(\frac{8}{9}\right) \Rightarrow \frac{9-8}{9} \Rightarrow \frac{1}{9} \Rightarrow 0.1111$$

$|x_2 - x_1| \Rightarrow |0.1111 - 1| \Rightarrow 0.8889$

"$i = 3$" putting $i = 3$ in formula

$$x_3 = x_2 - \frac{x_2 - x_1}{f(x_2) - f(x_1)} * f(x_2) \quad \text{---(ii)}$$

$x_1 = 1$

$f(x_1) = -8$

$x_2 = 0.1111$

$f(x_2) = (0.1111)^3 - 10(0.1111) + 1$

$= 0.00137 - 1.1111 + 1$

$= -0.1098$

Putting value of $x_1$, $x_2$ $f(x_1)$ $f(x_2)$ in eqn (ii)

$$x_3 = 0.1111 - \frac{0.1114 - 1}{-0.1098 - (-8)} * -0.1098$$

$$0.1111 - \left(\frac{(-0.8889}{7.8902}\right) * (-0.1098)$$

$$0.1111 - \frac{0.0976}{7.8902}$$

$$\frac{0.8766 - 0.0976}{7.8902} \Rightarrow \frac{0.779}{7.8902} = 0.0987$$

$x_3 = 0.0987$

$|x_3 - x_2| \Rightarrow |0.0987 - (0.1111)| \Rightarrow 0.0124$

"i = 4" put in formula

$$x_4 = x_3 - \frac{x_3 - x_2}{f(x_3) - f(x_2)} * f(x_3) \quad \text{---(iii)}$$

$x_2 = 0.1111$
$f(x_2) = -0.1098$
$x_3 = 0.0987$
$f(x_3) = (0.0987)^3 - 10(0.0987) + 1$
$0.0009 - 0.987 + 1$
$= 0.0139$

Putting value of $x_2$ $f(x_2)$ $x_3$ $f(x_3)$ in eqn (iii)

$$0.0987 - \begin{pmatrix} 0.0987 - 0.1111 \\ 0.0139 - (-0.1098) \end{pmatrix} * 0.0139$$

$$0.0987 - \begin{pmatrix} -0.0124 \\ 0.1237 \end{pmatrix} * 0.0139$$

$$0.0987 - \frac{0.0001}{0.1237}$$

$$\frac{0.0122 - 0.00017}{0.1237} = \frac{0.0123}{0.1237} = 0.0978$$

$x_4 = 0.0994$

$|x_4 - x_3| = |0.0978 - 0.0994| = 0.0016$

As the value is less then 0.001 we Stop Compuling

Programs

```
#include<iostream.h>
#include<conio.h>
#include<math.h>
int main()
  {
float x[20]; Fx[20];
  int i=0;
cout<< "Enter value of lower Bound";
cin>> x[i];
```

```
Cout<<"Enter the Value of upper bound";
  Cin>> x[i+1];
do
   {
fx[i]= x[i]*x[i]*x[i]-10*x[i]+1;
FX[i+1]=x[i+1]*x[i+1]*x[i+1]-10*x[i+1]+1;

x[i+2]= x[i+1]-((x[i+1]-x[i])/(FX[i+1]-Fx[i]))*fx[i+1];

  i++
  While(fabs(x[i+1]-x[i]))>0.0001)
   }
   return 0;
}
```

# Algorithm:

Secant Method for finding roots where "x" and "Fx" is an array of 20 elements and i is a loop Counter which is equal to 0

Step 1: Read x[0], x[0+1]

Step 2: Do Step 3 to 6 while(x[i+1]-x[i])>0.0001)

Step 3: Fx[i] = x[i]*x[i]*x[i]-10*x[i]+1;

step 4: Fx[i+1]=x[i+1]*x[i+1]*x[i+1]-10*x[i+1]+1

Step 5: $x[i+2]=x[i+1]-\left(\frac{x[i+1]-x[i]}{Fx[i+1]-Fx[i]}\right)*Fx[i]$

Step 6: increment in i

Step 7: Write "The Root is" x[i]