|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| k | X k | X k+1 | F k | F k+1 | |X k+1 - X k | |
| 0 | 0.1 | 0.5 | -5 | 3 | 0.4 |
| 1 | 0.5 | 0.35 | 3 | 2.14286 | 0.15 |
| 2 | 0.35 | -0.025 | 2.14286 | 45 | 0.375 |
| 3 | -0.025 | 0.36875 | 45 | 2.28814 | 0.39375 |
| 4 | 0.36875 | 0.389844 | 2.28814 | 2.43487 | 0.0210938 |
| 5 | 0.389844 | 0.0398193 | 2.43487 | -20.1134 | 0.350024 |
| 6 | 0.0398193 | 0.352046 | -20.1134 | 2.15947 | 0.312227 |
| 7 | 0.352046 | 0.321775 | 2.15947 | 1.89223 | 0.030272 |
| 8 | 0.321775 | 0.107423 | 1.89223 | -4.30899 | 0.214351 |
| 9 | 0.107423 | 0.256368 | -4.30899 | 1.09935 | 0.148945 |
| 10 | 0.256368 | 0.226092 | 1.09935 | 0.577016 | 0.0302759 |
| 11 | 0.226092 | 0.192646 | 0.577016 | -0.190858 | 0.0334453 |
| 12 | 0.192646 | 0.200959 | -0.190858 | 0.0238691 | 0.00831297 |
| 13 | 0.200959 | 0.200035 | 0.0238691 | 0.00081676 | 0.00092407 |
| 14 | 0.200035 | 0.2000001 | 0.00081676 | -4.2299E-06 | 0.00003544 |
| 15 | 0.2000001 | 0.2 | -4.2299E-06 | 7.46E-10 | 0.00000017 |

**Name: SOUJATYA ROY Roll No.:16CH10046**   
Q1.

Answer: 0.2

Q2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| k | T k | T k+1 | Y b | Y t | |Y b + Y t| -1 |
| 0 | 374.45 | 371.697 | 0.552092 | 0.532917 | 0.0850095 |
| 1 | 371.697 | 371.608 | 0.512183 | 0.490193 | 0.00257598 |
| 2 | 371.608 | 371.608 | 0.511141 | 0.488862 | 0.000002601 |
| 3 | 371.608 | 371.608 | 0.511139 | 0.488861 | 2.66E-12 |

Answer: Bubble point = 98.608°C  
 YB=0.511139 YT=0.488861

Q3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| k | T k | Y b | Y t | |T k+1 - T k| | |Y b + Y t| -1 |
| 0 | 393.17 | 0.888253 | 0.907449 | \_\_ | 0.795702 |
| 1 | 371.6657 | 0.511947 | 0.489725 | 21.5043 | 0.00167245 |
| 2 | 371.6077673 | 0.511136 | 0.488857 | 0.0579327 | -6.38378E-06 |
| 3 | 371.6079878 | 0.511139 | 0.488861 | 0.000220452 | 4.91123E-10 |
| 4 | 371.6079878 | 0.511139 | 0.488861 | 1.65987E-08 | -5.55112E-16 |

Answer: Bubble point = 98.6079878°C  
 YB=0.511139 YT=0.488861

Q4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| k | T k | T k+1 | X b | X t | |X b + X t| -1 |
| 0 | 371.4 | 374.454 | 0.23611 | 0.864635 | 0.100745 |
| 1 | 374.454 | 374.635 | 0.217333 | 0.788023 | 0.00535601 |
| 2 | 374.635 | 374.636 | 0.216277 | 0.78374 | 0.00001727 |
| 3 | 374.636 | 374.636 | 0.216274 | 0.783726 | 1.81171E-10 |

Answer: Dew point = 101.636°C  
 XB=0.216274 XT=0.783726

CODES:

Q1.

#include <iostream>  
using namespace std;

int main ()  
{  
 double x1, x2, x3, f1, f2, m, tol;  
 x1 = 0.1;  
 x2 = 0.5;  
 tol = 0.000001;

while (1)  
 {  
 f1 = 5 - 1 / x1;  
 f2 = 5 - 1 / x2;  
 cout<<x1<<"\t\t"<<x2<<"\t\t"<<(x2-x1)<<"\t\t"<<f2<<"\n";  
 m = (f2 - f1) / (x2 - x1);  
 x3 = x2 - (f2 / m);  
 if(x2>x1)  
 {  
 if((x2-x1)<=tol)  
 break;  
 }  
 else  
 {  
 if((x1-x2)<=tol)  
 break;  
 }  
 x1 = x2;  
 x2 = x3;  
 }  
 return 0;

}

Q2.

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

using namespace std;

int main ()  
{  
 double t0,t1,f1,f2,a1,a2,b1,b2,c1,c2,y1,y2;  
 t0=374.450000;  
 a1=15.9008;  
 a2=16.0137;  
 b1=2788.51;  
 b2=3096.52;  
 c1=-52.36;  
 c2=-53.67;  
 while(1)  
 {  
 f1=(((exp(a1-b1/(c1+t0)))\*0.3)+((exp(a2-b2/(c2+t0)))\*0.7))/760.0-1;

f2=((exp(a1-b1/(c1+t0)))\*(0.3\*b1)/((t0+c1)\*(t0+c1))+((exp(a2-b2/(c2+t0)))\*(0.7\*b2)/((t0+c2)\*(t0+c2))))/760.0;

t1=t0-f1/f2;  
 y1=((exp(a1-b1/(c1+t0)))\*0.3)/760.0;  
 y2=((exp(a2-b2/(c2+t0)))\*0.7)/760.0;

cout<<"\t"<<t0<<"\t"<<t1<<"\t"<<f1<<"\t\t"<<y1<<"\t\t"<<y2<<"\n";

if((f1<=0.000001)&&(f1>=-0.000001))  
 break;  
 t0=t1;  
 }  
 return 0;  
}

Q3.

#include <iostream>  
#include <math.h>  
using namespace std;

double caly1(double x)  
{  
 double f,a1=15.9008,b1=2788.51,c1=-52.36;  
 f=((exp(a1-b1/(c1+x)))\*0.3)/760.0;  
 return f;  
}

double caly2(double x)  
{  
 double f,a2=16.0137,b2=3096.52,c2=-53.67;  
 f=((exp(a2-b2/(c2+x)))\*0.7)/760.0;  
 return f;  
}

double func(double x)  
{  
 double f;  
 f=caly1(x)+caly2(x)-1;  
 return f;  
}

int main()  
{  
 double t0=355.73,t1=374.45,t2=393.17,t3,f0,f1,f2,g1,g2,c,h,d,y,y1,y2,y3,tol=0.000001;

while(1)  
 {  
 f0=func(t0);  
 f1=func(t1);  
 f2=func(t2);  
 g1=t1-t0;  
 g2=t2-t1;  
 y=g2/g1;  
 d=1+y;  
 h=y\*y\*f0-d\*d\*f1+(y+d)\*f2;  
 c=y\*(y\*f0-d\*f1+f2);  
 y1=(2\*d\*f2)/(-h+sqrt(h\*h-4\*d\*c\*f2));  
 y2=(2\*d\*f2)/(-h-sqrt(h\*h-4\*d\*c\*f2));

if(fabs(y1)>fabs(y2))  
 y3=y2;  
 else  
 y3=y1;

t3=t2+y3\*g2;

cout<<t3<<"\t"<<fabs(t3-t2)<<"\t"<<func(t2)<<"\t"<<caly1(t2)<<"\t"<<caly2(t2)<<"\n";

if(fabs(t3-t2)<=tol)  
 break;  
 t0=t1;  
 t1=t2;  
 t2=t3;  
 }  
 return 0;  
}

Q4.

#include <iostream>  
#include <math.h>  
using namespace std;

Int main ()  
{  
 double t0,t1,f1,f2,a1,a2,b1,b2,c1,c2,y1,y2;  
 t0=371.4;  
 a1=15.9008;  
 a2=16.0137;  
 b1=2788.51;  
 b2=3096.52;  
 c1=-52.36;  
 c2=-53.67;

while(1)  
 {  
 y1=(760.0\*0.4)/((exp(a1-b1/(c1+t0))));  
 y2=(760.0\*0.6)/((exp(a2-b2/(c2+t0))));  
 f1=(y1+y2)-1;

f2=-1\*((y1\*b1)/((t0+c1)\*(t0+c1))+((y2\*b2)/((t0+c2)\*(t0+c2))));  
 t1=t0-f1/f2;

cout<<"\t"<<t0<<"\t"<<t1<<"\t"<<f1<<"\t\t"<<y1<<"\t\t"<<y2<<"\n";

if((f1<=0.000001)&&(f1>=-0.000001))  
 break;  
 t0=t1;  
 }  
 return 0;  
}