

O`zbekiston Respublikasi
Xalq ta'lim vazirligi

Surxondaryo viloyati
pedagog kadrlarni qayta
tayyorlash va malakasini
oshirish instituti

"Tabiiy va aniq fanlar ta'limi"
KAFEDRASI

C++
dasturlash tili

(tajriba va amaliy mashg`ulotlarni o`tkazish bo`yicha)

Uslubiy qo`llanma

I-qism

Termiz-2013 ũ

АННОТАЦИЯ

Сўнгги йилларда дасурлашга бўлган қизиқиш тобора ортиб бормокда. Бу компьютер технологиясининг кун сайин ривожланиб бориши билан боғлиқдир. Айниқса визуал дастурлаш технологияларидан фойдаланиб дастурлар яратиш компьютер технологиясининг ривожланишига катта таъсир этмокда.

Ушбу ўқув қўлланмада талабаларга С++ дастурий воситасида визуал дастурлаш технологиялари ҳақида тўлиқ тасаввурга эга бўлиши учун керакли маълумотлар берилган.

Мазкур услубий қўлланма олий ўқув юртларининг талабалари учун “Дастурлаш асослари”, “Delphi дастурлаш тили”, “Borland С++ дастурлаш тили”, “Объектга йўналтирилган дастурлаш” фанларидан амалий ва тажриба машғулотлари ўтказишга мўлжалланган.

Услубий қўлланма С++ да программалашни ўрганиш учун зарур бўлган асосий тушунча ва кўрсатмаларни ўз ичига олган.

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муҳокама этилиб нашр учун тавсия этилди.

So`z boshi

Xozirgi vaqtga kelib komp`yuter olamida ko`plab dasturlash tillari mavjud. Paskal, C++ va boshqa dasturlash tillaridir. C++ dasturlash tili universal tildir. U UNIX sistemasi bilan bog`langan bo`lib, bu sistemada ishlatiladigan bir qancha dasturlar C++ tilida yozilgan. Paskal tili 1969 yil N. Virt tomonidan yaratilgan bo`lib, keyinchalik amerikaning Borland firmasi tomonidan qayta ishlandi va uni Turbo Pascal deb nomlangan. C++ Denis Ritchi tomonidan 1972 yili UNIX tipidagi operasion sistemalarini yaratish uchun loyihalashtirilgan.

Turbo Pascal ni qayta ishlash natijasida ob'ektli dasturlash yo`lga qo`yildi va 1995 yilda Borland kompaniyasi guruxi dastur tuzuvchilari Chack va Denny tomonidan Windows uchun mo`ljallangan dasturlash muxiti Borland Delphi dasturlash vositasi yaratildi.

C++ dasturlash tili Windows uchun mo`ljallangan bo`lib, uning birinchi versiyasi Windows operatsion sistema qobig`ida ishlagan.

C++ dasturlash tili – bu dasturlarni qayta ishlash muxiti bo`lib, Windows operatsion sistemasida ishlaydi. Unda ob'ektli dasturlash tillari bo`lgan Object mujassamlashgan.

C++ vizual proektlar, turli xolat protseduralarini qayta ishlash va dasturlarni qayta ishlashda vaqtdan yutish va boshqalarni o`z ichiga oladi.

1. Chiziqli algoritmlarni dasturlash

Bu bo'limda chiziqli algoritmgaga keltiriladigan masalalarni Delphi va Borland C++ da yechish bayon etilgan.

1.1-masala. A va B ikkita haqiqiy sonlar berilgan. Ularning yig'indisi, ayirmasi va ko'paytmasini hisoblang.

Yechish. A va b sonlar yig'indisini S, ayirmasini D, ko'paytmasini K bilan belgilasak, $S=a+b$, $d=a-b$, $k=a*b$ formulalar o'rinli bo'ladi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float a,b,s,p;
cout<<"a=";<<cin>>a;
cout<<"b=";<<cin>>b;
s=a+b;
p=a*b;
cout <<"s=" <<s;
cout<<"p=" <<p;
system("PAUSE");
return 0;
}
```

1.2-masala. Ikkita musbat son berilgan, bu sonlarning o'rta arifmetik va o'rta geometrik qiymatlarini aniqlang.

Yechish. A va b sonlarning o'rta arifmetik qiymatini c, o'rta geometrik qiymatini

B bilan belgilasak, $c = \frac{a + b}{2}$; $d = \sqrt{a \cdot b}$; formulalar o'rinli.

C++ da dasturu:

```
#include <math.h>
#include<iostream.h>
Int main()
{
float a,b,s,p;
cout<<"a=";<<cin>>a;
cout<<"b=";<<cin>>b;
s=(a+b)/2;
p=sqrt(a*b);
cout <<"s=" <<s;
cout<<"p=" <<p;
system("PAUSE");
return 0;
}
```

1.3-masala. Tomonlari A va B ga teng to'g'ri to'rtburchakning yuzi va perimetri hisoblansin. Yechish. To'g'ri to'rtburchakning yuzi $s = a \cdot b$, perimetri $p = 2 \cdot (a + b)$ formulalar yordamida aniqlanadi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float a,b,s,p;
cout<<"a=";>>a;
cout<<"b=";>>b;
s=a+b;
p=2*(a*b);
cout <<"s=" <<s;
cout<<"p=" <<p;
system("PAUSE");
return 0;
}
```

1.4-masala. R1, R2, R3 uchta qarshiliklar ketma-ket ulangan zanjirning qarshiligini aniqlang. Yechish.

Zanjirning umumiy qarshiligi R bilan belgilasak, ketma-ket ulashda $R = R_1 + R_2 + R_3$ formulalar o'rinli bo'ladi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float R1,R2,R3,R;
cout <<"R1=";>>R1;
cout<<"R2=";>>R2;
cout<<"R3=";>>R3;
R=R1+R2+R3;
cout<<"R=" <<R;
system("PAUSE");
return 0;
}
```

1.5-masala. Massalari M1 va M2 (kg) ga teng, oralaridagi masofa R (m) ga teng bo'lgan ikkita jismning o'zaro tortilish kuchi F aniqlansin. Bunda gravitatsion doimiy $G=6,672 \cdot 10^{-11}$ ($N \cdot m^2/kg^2$) deb olinsin.

Yechish. Butun olam tortilish qonuniga ko'ra $F = G \frac{m_1 \cdot m_2}{R^2}$;

Erning massasi $m_1 = 5,97 \cdot 10^{24}$

Oyning massasi $m_2 = 7,35 \cdot 10^{22}$

Er bilan Oy orasidagi masofa $R = 3,844 \cdot 10^8$

Izoh. Er bilan Oyning massalari kilogrammda, masofa mertda, kuch Nyutonda o'lchanadi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float M1,M2,R,F;
float G=6.672E-11
cout<<"M1=";<<cin>>M1;
cout<<"M2=";<<cin>>R2;
cout<<"R=";<<cin>>R;
F=G*M1*M2/(R*R);
cout<<"F=" <<F;
system("PAUSE");
return 0;
}
```

1.6-masala. Teng tomonli uchburchakning tomoni A ga teng. Uchburchakning yuzini toping.

Yechish. Teng tomonli uchburchakning yuzini S bilan belgilasak, $S = a^2 \cdot \frac{\sqrt{3}}{4}$

Formula o'rinli bo'ladi.

C++ da dasturu:

```
#include <math.h>
#include<iostream.h>
Int main()
{
float a,s;
cout<<"a=";<<cin>>a;
S=(sqrt(3))*a*a/4;
cout <<"S=" <<S;
system("PAUSE");
return 0;
}
```

1.7-masala. Koordinatalari X1,Y1 va X2, Y2 ga teng bo'lgan nuqtalari orasidagi masofani hisoblang.

Yechish. Ikki nuqta orasidagi masofa $S = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$; formula yordamida aniqlanadi.

C++ da dasturu:

```

#include <math.h>
#include<iostream.h>
Int main()
{
float x1,x2,y1,y2,d;
cout<<"x1=";>>x1;
cout<<"x2=";>>x2;
cout<<"y1=";>>y1;
cout<<"y2=";>>y2;
d=sqrt(sqr(x2-x1)+sqr(y2-y1));
cout <<"d=" <<d;
system("PAUSE");
return 0;
}

```

1.8-masala. Birinchi hadi A, ayirmasi D, hadlari soni N ga teng arifmetik progressiyaning hadlarining yig'indisini hisoblang.

Yechish. Arifmetik progressiya istalgan hadi va hadlari yig'indisi uchun

$$a_n = a + d \cdot (n - 1), \quad S_n = \frac{2 \cdot a + d \cdot (n - 1) \cdot n}{2}, \quad \text{formular o'rinli bo'ladi.}$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
float a1,d,n,S;
cout<<"a1=";>>a1;
cout<<"d=";>>d;
cout<<"n=";>>n;
S=(2*a1+d*(n-1))/2*n;
cout <<"S=" <<S;
system("PAUSE");
return 0;
}

```

1.9-masala. Birinchi hadi B, maxraji Q va hadlari soni N ga teng geometrik progressiyaning hadlarining yig'indisini hisoblang.

Yechish.

Geometrik progressiyaning istalgan hadi va hadlari yig'indisi

$$b_n = b \cdot q^{n-1}; \quad s_n = \frac{b \cdot q - b}{q - 1}; \quad \text{formula yordamida aniqlanadi.}$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
float B,q,n,S;
cout<<"B=";>>B;
cout<<"q=";>>q;
cout<<"n=";>>n;
S=(B*(1-exp(N*ln(q))))/(1-q);
cout <<"S=" <<S;
system("PAUSE");
return 0;
}

```

1.10-masala. Uchta idishga suv solingan. Idishlardagi suvning temperaturasi T1, T2, T3 ga teng, hajmi V1, V2, V3 (l) ga teng. Idishlardagi suvni bitta idishga quyilsa, uning hajmi va temperaturasi qanday bo'ladi?

Yechish. Idishlardagi suvni bitta idishga quyilsa, suvning hajmi va temperaturasi

$V = V_1 + V_2 + V_3$; $T = \frac{V_1 * T_1 + V_2 * T_2 + V_3 * T_3}{V}$ formulalar bilan aniqlanadi.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
float T1,T2,T3,T,V1,V2,V3,V;
cout<<"T1=";>>T1;
cout<<"T2=";>>T2;
cout<<"T3=";>>T3;
cout<<"V1=";>>V1;
cout<<"V2=";>>V2;
cout<<"V3=";>>V3;
T=(T1*V1+T2*V2+T3*V3)/(V1+V2+V3);
V=V1+V2+V3;
cout <<"T=" <<T;
cout<<"V=" <<V;
system("PAUSE");
return 0;
}

```

1.11-masala. Berilgan sonning butun qismini aniqlang.

Yechish. A sonning butun qismini B bilan belgilasak, $B=int(A)$ formula bilan aniqlanadi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float a,b,s;
cout<<"a=";<<cin>>a;
cout<<"b=";<<cin>>b;
s=a div b;
cout <<"s=" <<s;
system("PAUSE");
return 0;
}
```

1.12-masala. N/M ifodani hisoblashda hosil bo'ladigan qoldiqni toping.
Yechish.

Qoldiqni Z bilan belgilasak, u holda $Z = N - INT \left(\frac{N}{M} \right) \cdot M$ formula bilan hisoblanadi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
float N,M,R;
cout<<"N=";<<cin>>N;
cout<<"M=";<<cin>>M;
R= N mod M;
cout<<"R=" <<R;
system("PAUSE");
return 0;
}
```

1.13-masala. Sonni berilgan aniqlikda yaxlitlang.
Yechish.

A sonni N ta o'nli xonalar aniqligida yaxlitlash uchun

$$\frac{B = INT (A \cdot 10^N + 0.5)}{10^N};$$
 formuladan foydalanamiz.

C++ da dasturu:

```
#include<iostream.h>
#include<math.h>
Int main()
{
float A,N,B;
cout<<"A=";<<cin>>A;
```

```

cout<<"N=";>>N;
B=INT(A*EXP(N*LN(10))+0.5)/EXP(N*LN(10));
cout<<"B=" <<B;
}

```

1.14-masala. Berilgan burchakni radian o'lchovidan gradus o'lchoviga o'tkazing.

Yechish. A gradusga teng burchakni radian o'lchoviga ushbu formula yordamida o'tkaziladi.

$$B = A \cdot \frac{3,14159}{180};$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
float alfa,k;
float pi=3.14;
cout<<"alfa=";>>alfa;
cout<<"k=";>>k;
k=alfa*pi/180;
cout <<"k=" <<k;
system("PAUSE");
return 0;
}

```

1.15-masala. Berilgan burchakni gradus o'lchovidan radian o'lchoviga o'tkazing.

Yechish. A radianga teng burchakni gradus o'lchoviga o'tkazish uchun

$$B = \frac{A \cdot 180}{3,14159};$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
float a,b;
float pi=3.14;
cout<<"a=";>>a;
b=a*180/pi;
cout <<"b=" <<b;
system("PAUSE");
return 0;
}

```

1.16-masala. Argument X ning qiymatlari berilganda $F=2(x+3)+3(x+3)^2$ funksiyaning qiymatlarini aniqlang.

Yechush. Dastur qisqaroq bo'lishi uchun $y=x+3$ oraliq o'zgaruvchi kiritamiz.

C++ da dasturu:

```
#include <math.h>
#include<iostream.h>
Int main()
{
float x,f;
cout<<"x=";>>x;
f=2*(x+3)+3*sqr(x+3);
cout <<"f=" <<f;
system("PAUSE");
return 0;
}
```

1.17-masala. Uzunligi $L(m)$ ga teng matematik mayatnikning tebranish davrini hisoblang. (Hisoblash formulasi $T=2\pi \sqrt{LG}$, bunda $\pi = 3.14$; $G = 9.81$ (m/s^2)).

C++ da dasturu:

```
#include <math.h>
#include<iostream.h>
Int main()
{
float G=9.81;
float L,T;
cout<<"L=";>>L;
T=2*pi*sqrt(L/G);
cout <<"T=" <<T;
system("PAUSE");
return 0;
}
```

1.18-masala. Aylananing uzunligi C berilgan. Shu aylana bilan chegaralangan doiraning yuzi S ni aniqlang. (Hisoblash formulasi: $S=C^2/4\pi$).

C++ Builder da dasturu:

```
#include<iostream.h>
Int main()
{
float pi=3.14;
float c,S;
cout<<"c=";>>c;
S=c*c/(4*pi);
cout <<"S=" <<S;
system("PAUSE");
return 0;
}
```

1.19-masala. Radiuslari A va R ga teng ($A < R$) halqa yuzi hisoblansin. (Hisoblash formulasi: $S = \pi (R^2 - A^2)$).

C++ da dasturu:

```
#include<math.h>
#include<iostream.h>
Int main()
{
float pi=3.14;
float a,r,s;
cout<<"a=";<<cin>>a;
cout<<"r=";<<cin>>r;
if (a<r) s=pi*(r*r-a*a);
if (a>r) s=pi*(r*r-a*a);
cout <<"s=" <<s;
system("PAUSE");
return 0;
}
```

1.20-masala. Uchburchakning A va B ikkita tomoni va ular orasidagi burchagi G (gradusda) berilgan. Uchburchakning uchinchi tomonini toping. (Hisoblash formulasi: $C = \sqrt{(A^2 + B^2 - 2AB \cdot \cos G)}$).

C++ da dasturu:

```
#include <math.h>
#include<iostream.h>
Int main()
{
float pi=3.14;
float a,b,g,c;
cout<<"a=";<<cin>>a;
cout<<"b=";<<cin>>b;
cout<<"g=";<<cin>>g;
g=g*pi/180;
c=sqrt(a*a+b*b-2*a*b*cos(g));
cout <<"c=" <<c;
system("PAUSE");
return 0;
}
```

TAJRIBA ISHI TOPSHIRIQLARI

Topshiriq: 1) Quyidagi topshiriqlarni algoritm, blok-sxemasi va dasturini Paskal dasturlash tilida tuzing:

1.	$a = \frac{2 \cos(x - \pi/6)}{1/2 + \sin^2 y} \quad b = 1 + \frac{z^2}{3 + z^3/5}$	x = 1,426 y = -1,220, z = 3,5
2.	$j = \left x^{y/x} - \sqrt[3]{\frac{y}{x}} \right \quad \psi = (y-x) \frac{y - z/(y-x)}{1 + (y-x)^2}$	x = 1,825 y = 18,225 z = -3,298
3.	$S = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}, \quad \varphi = x(\sin x^3 + \cos^2 y)$	x = 0,335 y = 0,025
4.	$y = e^{-bt} \sin(at + b) - \sqrt{bt + a}, \quad S = b \sin(at^2 \cos 2t) - 1$	a = -0,5, b = 1,7 t = 0,44
5.	$\omega = \sqrt{x^2 + b} - b^2 \sin^3(x + a) / x$ $y = \cos^2 x^3 - \frac{x}{\sqrt{a^2 + b^2}}$	a = 1,5 b = 15,5 x = -2,9
6.	$S = x^3 \operatorname{tg}^2(x + b)^2 + \frac{a}{\sqrt{x + b}}, \quad Q = \frac{bx^2 - a}{Ax}$	a = 16,5, b = 3,4 j = 0,61
7.	$R = x^2(x + 1) / b - \sin^2(x + a), \quad S = \sqrt{xb/a} + \cos^2(x + b)^3$	a = 0,7, b = 0,05 x = 0,5
8.	$y = \sin^3(x^2 + a)^2 - \sqrt{x/b}, \quad Z = \frac{x^2}{A} + \cos(x + b)^2$	a = 1,1, b = 0,004 x = 0,2
9.	$f = \sqrt[3]{mtgt} + c \sin t , \quad z = m \cos(bt \sin t) + c$	m = 2, c = -1 t = 1,2, b = 0,7
10.	$y = btg^2 x - \frac{A}{\sin^2(x/a)}, \quad S = b \sin(at^2 \cos 2t) - 1$	a = 3,2 b = 17,5, x = -4,8
11.	$a = \frac{2 \cos(x - \pi/6)}{1/2 + \sin^2 y}, \quad b = 1 + \frac{z^2}{3 + z^3/5}$	x = 1,4 y = -1,2, z = 3,05
12.	$j = \left x^{y/x} - \sqrt[3]{\frac{y}{x}} \right , \quad \psi = (y-x) \frac{y - z/(y-x)}{1 + (y-x)^2}$	x = 1,8 y = 18,2 z = -3,02
13.	$S = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}, \quad \varphi = x(\sin x^3 + \cos^2 y)$	x = 0,303 y = 0,02
14.	$y = e^{-bt} \sin(at + b) - \sqrt{bt + a}, \quad S = b \sin(at^2 \cos 2t) - 1$	a = -0,05, b = 1,17 t = 0,24
15.	$\omega = \sqrt{x^2 + b} - b^2 \sin^3(x + a) / x, \quad y = \cos^2 x^3 - \frac{x}{\sqrt{a^2 + b^2}}$	a = 1,15 b = 15,05 x = -2,19
16.	$S = x^3 \operatorname{tg}^2(x + b)^2 + \frac{a}{\sqrt{x + b}}, \quad Q = \frac{bx^2 - a}{Ax}$	a = 1,5, b = 3,14 j = 0,65
17.	$R = x^2(x + 1) / b - \sin^2(x + a), \quad S = \sqrt{xb/a} + \cos^2(x + b)^3$	a = 0,17, b = 0,5

		x = 0,15
18.	$y = \sin^3(x^2 + a)^2 - \sqrt{x/b}$, $Z = \frac{x^2}{A} + \cos(x + b)^2$	a = 1,01, b = 0,04 x = 0,12
19.	$f = \sqrt[3]{mtgt + c \sin t }$, $z = m \cos(bt \sin t) + c$	m = 2, c = -1 t = 1,02, b = 0,17
20.	$y = btg^2 x - \frac{A}{\sin^2(x/a)}$, $S = b \sin(at^2 \cos 2t) - 1$	a = 3,02, b = 17,15 x = -4,28
21.	$a = \frac{2 \cos(x - \pi/6)}{1/2 + \sin^2 y}$ $b = 1 + \frac{z^2}{3 + z^3/5}$	x = 1,4, y = -1,2 z = 3,5
22.	$j = \left x^{y/x} - \sqrt[3]{\frac{y}{x}} \right $, $\psi = (y - x) \frac{y - z/(y - x)}{1 + (y - x)^2}$	x = 1,18 y = 18,02 z = -3,2
23.	$S = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!}$, $\varphi = x(\sin x^3 + \cos^2 y)$	x = 0,3 y = 0,012
24.	$y = e^{-bt} \sin(at + b) - \sqrt{bt + a}$, $S = b \sin(at^2 \cos 2t) - 1$	a = -0,15, b = 1,07 t = 0,4
25.	$\omega = \sqrt{x^2 + b} - b^2 \sin^3(x + a)/x$, $y = \cos^2 x^3 - \frac{x}{\sqrt{a^2 + b^2}}$	a = 1,15, b = 15,05 x = -2,19
26.	$S = x^3 tg^2(x + b)^2 + \frac{a}{\sqrt{x + b}}$, $Q = \frac{bx^2 - a}{Ax}$	a = 16,15 b = 3,24
27.	$R = x^2(x + 1)/b - \sin^2(x + a)$, $S = \sqrt{xb/a} + \cos^2(x + b)^3$	a = 0,17, b = 0,5 x = 0,5
28.	$y = \sin^3(x^2 + a)^2 - \sqrt{x/b}$, $Z = \frac{x^2}{A} + \cos(x + b)^2$	a = 1,11, b = 0,04 x = 0,12
29.	$f = \sqrt[3]{mtgt + c \sin t }$, $z = m \cos(bt \sin t) + c$	m = 2, c = -2 t = 1,02, b = 0,17
30.	$y = btg^2 x - \frac{A}{\sin^2(x/a)}$, $y = \cos^2 x^3 - \frac{x}{\sqrt{a^2 + b^2}}$	a = 3,12, b = 17,5 x = -4,08

2. Tarmoqlanuvchi algoritmlar

2.1-masala. $Ax^2+Bx+C=0$ kvadrat tenglamaning ildizlarini toping.

Yechish.

Kiritiladigan ma'lumotlar – bu tenglama koeffitsienti: a – noma'lumning ikkinchi darajasi;

b – noma'lumning birinchi darajasi; c – o'zgarmas son.

Topiladigan natija – x1 va x2 tenglama ildizlari.

Buyruqlar:

Diskriminantni hisoblash formulasi:

$$d = b^2 - 4ac$$

Agar diskriminant natijasi nolga teng yoki katta bo'lsa, u xolda quyidagi formula bilan tenglama ildizlari topiladi:

$$x_1 = \frac{-b - \sqrt{d}}{2a}; \quad x_2 = \frac{-b + \sqrt{d}}{2a}$$

Agar diskriminant natijasi noldan kichik bo'lsa, bu tenglamaning ildizi yo'qligini bildiradi.

Kvadrat tenglama algoritmining dasturi dastur matni keltirilgan bo'lib, dialogli oynasi quyidagicha.

C++ da dasturu:

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

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

```
Int main()
```

```
{
```

```
float a,b,c,d,x1,x2;
```

```
cout<<"a=";<<cin>>a;
```

```
cout<<"b=";<<cin>>b;
```

```
cout<<"c=";<<cin>>c;
```

```
d=b*b-4*a*c;
```

```
if (d<0)
```

```
cout<<("tenglamaning haqiqiy ildizlari yoq");
```

```
if (d>0)
```

```
x1=(-b-sqrt(d))/(2*a);
```

```
x2=(-b+sqrt(d))/(2*a);
```

```
cout <<"x1=" <<x1;
```

```
cout<<"x2=" <<x2;
```

```
if (d=0)
```

```
x1=-b/(2*a);
```

```
cout <<"x1=" <<x1;
```

```
system("PAUSE");
```

```
return 0;
```

```
}
```

2.2-masala. Ikki butun musbat son M va N larning eng katta umumiy bo'luvchisi (EKUB) ni aniqlang.

```
C++da dasturu:
#include<iostream.h>
Int main()
{
    int m,n,x,y;
    m=StrToInt(Edit1->Text);
    n=StrToInt(Edit2->Text);
    x=m;y=n;
    A:
    if (x=y) goto B;
    if (x>y) x=x-y;
    if (x<y) y=y-x;
    goto A;
    B: cout <<"x=" <<x;
    system("PAUSE");
    return 0;
}
```

2.3-masala. Ikkita X va Y sonlarning kattasini tanlash (EKT) dasturini tuzing.

```
C++ da dasturu:
#include<iostream.h>
Int main()
{
    int m,y,x;
    cout<<"x=";>>x;
    cout<<"y=";>>y;
    if (x==y)
    cout<<("Bu sonlar teng");
    if (x>y) m=x; cout <<"m=" <<m;
    if (x<y) x1=-b/(2*a);
    cout <<"x1=" <<x1;
    system("PAUSE");
    return 0;
}
```

2.4-masala. X va Y haqiqiy sonlar berilgan. Z ni hisoblang:

$$Z = \begin{cases} X - Y, & \text{agar } X > Y \text{ bo'lsa} \\ X + 1, & \text{agar } X \leq Y \text{ bo'lsa} \end{cases}$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
int z,y,x;
cout<<"x=";>>x;
cout<<"y=";>>y;
if (x>y)
{ z=x-y;
}
else {
z=x+1;
}
cout <<"z=" <<z;
system("PAUSE");
return 0;
}

```

2.5-masala. Raketa g (km/soat) tezlik bilan Yer ekvatoridagi nuqtadan Yerning Quyosh atrofidagi orbitasi bo'ylab uchiriladi. Raketani uchirish natijasi qanday bo'ladi?

Yechish. Ma'lumki, agar $g < 7,8 \frac{\text{km}}{\text{s}}$; bo'lsa, raketa yerga qaytib tushadi.

Agar $7,8 < g < 11,2$ bo'lsa, raketa Yer yo'ldoshiga aylanadi;

Agar $11,2 < g < 16,4$ bo'lsa, raketa quyosh yo'ldoshiga aylanadi;

Agar $g > 16,4$ bo'lsa, raketa quyosh sistemasidan chiqib ketadi.

C++ da dasturu:

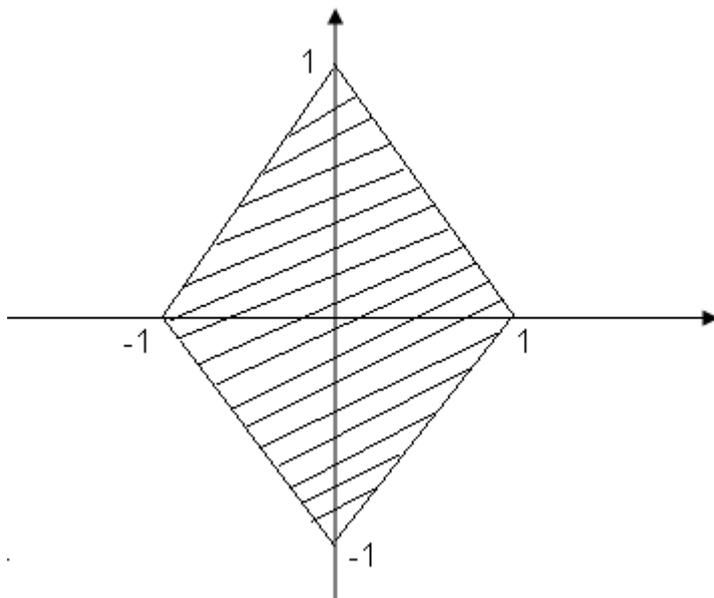
```

#include<iostream.h>
Int main()
{
float a;
cout<<"a=";>>a;
if a<7.9 cout <<" Raketa Yerga qaytib tushadi=" <<a;
if (a>=7.9) and (a<11.2)
cout <<"Raketa Yerning sun`iy yo`ldoshiga aylanadi =" <<a;
if (a>=11.2) and (a<16.7)
cout <<"Raketa Quyoshning sun`iy yo`ldoshiga aylanadi=" <<a;
if a>=16.7 cout<<"Raketa Galaktikaning sun`iy yo`ldoshiga aylanadi=" <<a;
system("PAUSE");
return 0;
}

```

2.6-masala. Koordinatalari x va y ga teng bo'lgan nuqta 2.1-rasmda tasvirlangan tekislikdagi shaklga tegishlimi?

Yechish. Koordinatalari quyidagi shatlarni qanoatlantiradigan nuqtalar berilgan shaklga tegishli bo'ladi: $|x| + |y| \leq 1$



2.1-rasm

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Float y,x;
cout<<"x=";>>x;
cout<<"y=";>>y;
if (x>-1) and (x<1) and (y>-1) and (y<1)
cout <<"Tegishli ="
else cout <<"Tegishli emas ";
system("PAUSE");
return 0;
```

2.7-masala. Lakmus qog'ozidan foydalanib eritma muhitini aniqlang.

Yechish. Ma'lumki, eritmaga tushirilgan lakmus qog'ozi qizil bo'lsa, eritma kislotali;

Ko'k bo'lsa, ishqorli; aks holda eritma neytral bo'ladi.

C++da dasturu:

```
#include<iostream.h>
Int main()
{
Char a[10];
cout<<"Rangni kiriting =">>a;
if a='qizil' then
cout <<"Eritma kislotaliil";
```

```

if a='ko`k'
cout <<"Eritma ishqorli"
Else
{
    cout <<"Eritma neytral" ;
}
}
}

```

2.8-masala. Agar kvadratning tomoni A, doiraning radiusi R ga teng bo'lsa, kvadrat va doiraning yuzlarini solishtirib kattasini aniqlang.

Yechish. Kvadratning yuzi $s = a^2$, doiraning yuzi $k = \pi r^2$ (bunda $\pi = 3,14159$) formula yordamida aniqlanadi.

```

C++ da dasturu:
#include<iostream.h>
Int main()
{
Float a,r,sk,sd;
cout<<"a=";<<cin>>a;
cout<<"r=";<<cin>>r;
sk=a*a; sd=pi*r*r;
if sk>sd then
{
cout <<"Kvadratning yuzi katta!";
}
else
{
if sk<sd then
{
cout <<" Doiraning yuzi katta!";
}
}
else
{
cout <<" Yuzlari teng!";
}
system("PAUSE");
return 0;
}

```

2.9-masala. Quyidagi funksiya hisoblansin: $x > 0$ bo'lganda 1 ga teng; $x = 0$ da nolga teng; $x < 0$ da -1 ga teng.

Yechish. Berilgan funksiya $y = \text{sign}(x)$ bilan belgilanadi.

$$\text{sign}x = \begin{cases} 1, & \text{agar } x > 0 \\ 0, & \text{agar } x = 0 \\ -1, & \text{agar } x < 0 \end{cases}$$

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Float x,y;
cout <<"x=" <<x;
if (x>0)
y=1
else
{
if (x=0)
y=0
else
y=-1;
}
cout <<"y=" <<y;
system("PAUSE");
return 0;
}
```

2.10-masala. Berilgan N yil kabisa yili bo'lish-bo'lmasligini aniqlang. Agar N 100 ga karrali son bo'lmasa va uning oxirgi ikki raqami 4 ga karrali son bo'lsa, u holda N-yil kabisa yilidir. Agar N soni 100 karrali bo'lsa, u holda N soni 400 ga karrali bo'lgandagina mazkur yil kabisa yili bo'ladi.

Yechish. Ushbu $w = n - \text{int}\left(\frac{n}{u}\right) * u$ qoldiqni topish formulasini qism dasturga

kiritib, undan n conni u=100, u=400 va u=4 ga bo'lish natijasida hosil bo'lgan qoldiqni topishda uch marta foydalanamiz.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Int n;
cout <<"n=" <<n;
if (n mod 100=0)
{
if (n mod 400 =0)
cout <<"Bu yil kabisa yili";
else
cout <<" Bu yil kabisa yili emas!" ;
}
}
```

```

Else
{
if (n mod 4 =0)
cout <<"Bu yil kabisa yili";
else
cout <<" Bu yil kabisa yili emas!" ;
}
system("PAUSE");
return 0;
}

```

2.11-masala. A, B, C sonlar mos ravishda uchta kesmaning uzunliklarini ifodalaydi. Agar kesmalar uchburchakning tomonlarini ifodalasa, uchburchakning yuzi S, uchburchakka tashqi va ichki chizilgan aylanalarning radiuslari R1 va R2 larni toping.

Yechish. Agar $p = \frac{a + b + c}{2}$; belgilash kiritsak, uchburchakning mavjud bo'lish sharti $p \cdot (p - a) \cdot (p - b) \cdot (p - c) > 0$; shaklda yoziladi. Uchburchakning yuzi

$$s = \sqrt{p \cdot (p - a) \cdot (p - b) \cdot (p - c)}; \text{ tashqi aylananing radiusi } r_1 = \frac{a \cdot b \cdot c}{4 \cdot s};$$

ichki aylananing radiusi $r_2 = \frac{s}{p}$; formula yordamida aniqlanadi.

C++ da dasturu:

```

#include <math.h>
#include<iostream.h>
Int main()
{
Float a,b,c,r1,r2,s,p;
cout<<"a=";>>a;
cout<<"b=";>>b;
cout<<"c=";>>c;
if ((a+b)>c) and ((a+c)>b) and ((b+c)>a)
{
p=(a+b+c)/2;
s=sqrt(p*(p-a)*(p-b)*(p-c));
r2=s/p;
r1=a*b*c/(4*s);
cout <<"r1=" <<r1;
cout <<"r2=" <<r2;
cout <<"s=" <<s;
}
else cout <<"Kiritilgan sonlar uchburchak tomonlarini ifodalamaydi! ";
system("PAUSE");

```

```
return 0;
}
```

2.12-masala. $Ax+B=0$ tenglamani yeching.

Yechish. Ma'lumki, $a \cdot x + b = 0$ tenglamaning yechimi quyidagicha aniqlanadi:

- 1). $A=0, b=0$ bo'lsa, tenglama cheksiz ko'p yechimga ega;
- 2). $A=0, b \neq 0$ bo'lsa, tenglama yechimga ega emas;
- 3). $A \neq 0$, bo'lsa, tenglama $x = -\frac{b}{a}$ yagona yechimga ega ;

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Float a,b,x;
cout<<"a=";>>a;
cout<<"b=";>>b;
if (a=0)
{
if (b!=0)
cout <<"Bu tenglamaning yechimi yo`q! "
else
cout <<"Bu tenglamaning yechimlari cheksiz ko`p! "
else
{ x=-b/a;
cout <<"x=" <<x;
}
}
system("PAUSE");
return 0;
}
```

2.13-masala. Bir tomoni va unga yopishgan ikkita burchagi berilgan uchburchakning uchinchi burchagi va qolgan ikki tomonini aniqlang.

Yechish. Uchburchakning a tomoni va b_1, c_1 burchaklari gradus o'lchovida berilgan. a_1 burchakni $a_1 = 180 - (b_1 + c_1)$ formula yordamida aniqlaymiz. a_1, b_1, c_1 burchaklarning radian o'lchovidagi kattaligini a_2, b_2, c_2 bilan belgilasak,

$$a_2 = \frac{\pi \cdot a_1}{180}; \quad b_2 = \frac{\pi \cdot b_1}{180}; \quad c_2 = \frac{\pi \cdot c_1}{180}; \quad \text{formulalar o'rinli bo'ladi. Bunda } \pi = 3,14159 \dots$$

B va c tomonlarni sinuslar teoremasiga asosan aniqlaymiz:

$$b = \frac{a \cdot \sin b_2}{\sin a_2}; \quad c = \frac{a \cdot \sin c_2}{\sin a_2};$$

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
Float pi=3.14;
Float a,ab,bb,b,c,cb;
cout<<"a=";<<cin>>a;
cout<<"ab=";<<cin>>ab;
cout<<"bb=";<<cin>>bb;
cb=pi-ab*pi/180-bb*pi/180;
b=a*sin(bb)/sin(ab);
c=a*sin(cb)/sin(ab);
cout <<"cb=" <<cb;
cout <<"b=" <<b;
cout <<"c=" <<c;
system("PAUSE");
return 0;
}

```

2.14-masala. Uchta sonning berilgan bularninig eng kattasi (EKT) ni toping.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
Float a,b,c,max;
cout<<"a=";<<cin>>a;
cout<<"b=";<<cin>>b;
cout<<"c=";<<cin>>c;
if (a>b)
max=a
else
max=b;
if (max>c)
max=max
else
max=c;
cout <<"max=" <<max;
system("PAUSE");
return 0;
}

```

2.15-masala. Uzunligi 1 ga teng matematik mayatnikning osilgan nuqtasi qo'zg'almas yoki yuqoriga yo pastga tazlanish bilan harakatlangan hollarda uning tebranish davri aniqlansin.

Yechish. Agar mayatnik osilgan nuqta qo'zg'almas bo'lsa, $T = 2 \cdot \pi \cdot \sqrt{\frac{l}{g}}$; mayatnik osilgan nuqta yuqoriga a tezlanish bilan harakatlansa, $T_1 = 2 \cdot \pi \cdot \sqrt{\frac{l}{g+a}}$; mayatnik osilgan nuqta pastga a tezlanish bilan harakatlansa, $T_2 = 2 \cdot \pi \cdot \sqrt{\frac{l}{a-g}}$; formulalar o'rinli bo'ladi. Bunda $\pi = 3,14159$, $g=9,81$ deb olish mumkin. Agar $a=g$ bo'lsa, mayatnik vaznsizlik holatida bo'ladi va bu holatda mayatnik tebranmaydi.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Float pi=3.14;
Float L,A;
cout<<"L=";>>L;
cout<<"A=";>>A;
if (A=0)
{
cout <<"T=" <<2*pi*sqrt(L/G;
else
if (A=G)
cout <<"mayatnik vazinsiz holatda bo`ladi"
}
Else
if (A<G)
cout <<"T1=" <<2*pi*sqrt(L/(G+A;
else
cout <<"T2=" <<2*pi*sqrt(L/(A-G;
system("PAUSE");
return 0;
}
```

2.16-masala. Uchta X, Y, Z haqiqiy sonlar berilgan. Bu sonlardan qaysi biri (1,5) intervalga tegishli ekanligini aniqlang.

Yechish. (1,5) intervalga tegishli sonlarni aniqlashni qism-dastur yordamida kiritamiz.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
Float x,y,z;
```

```

cout<<"x=";>>cin>>x;
cout<<"y=";>>cin>>y;
cout<<"z=";>>cin>>z;
if (x>1) and (x<5)
cout <<"x=" <<x;
  if (y>1) and (y<5)
cout <<"y=" <<y;
  if (z>1) and (z<5)
cout <<"z=" <<z;
system("PAUSE");
return 0;
}

```

2.17-masala. Uchta X, Y, Z musbat sonlar berilgan. Tomonlari X, Y, Z ga teng uchburchak mavjudmi? Agar mavjud bo'lsa bu uchburchakning yuzini toping.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
Float x,y,z,s,p;
cout<<"x=";>>cin>>x;
cout<<"y=";>>cin>>y;
cout<<"z=";>>cin>>z;
if (x+y>z) and (x+z>y) and (z+y>x)
{
cout <<"Bunday uchburchak mavjud! ";
p=(x+y+z)/2;
s=sqrt(p*(p-x)(p-y)(p-z));
cout <<"s=" <<s;
}
else cout <<"Bunday uchburchak mavjud emas! ";
system("PAUSE");
return 0;
}

```

2.18-masala. Koordinatalari berilgan M(X,Y) nuqtaning radiusi R ga teng va markazi koordinatalar boshida bo'lgan doiraga tegishli bo'lishini aniqlang.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
Float x,y,r;
cout<<"x=";>>cin>>x;
cout<<"y=";>>cin>>y;

```

```

cout<<"r=";>>r;
if (x*x+y*y>r*r)
{
cout <<"M("<<x<<y<<"nuqta " <<r<<"bo`lgan doiraga tegishli emas!";
else
cout <<"M("<<x<<y<<"nuqta " <<r<<"bo`lgan doiraga tegishli!";
system("PAUSE");
return 0;
}

```

2.19-masala. Koordinatalari berilgan M(X,Y) nuqtaning koordinata tekisligining qaysi choragida ekanligini aniqlaydigan dastur tuzing.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
Float x,y;
Int k;
cout<<"x=";>>x;
cout<<"y=";>>y;
if (x<0) and (y<0)
k=3;
if ((x<0) or (x>0)) and (y=0)
k=0;
if (x<0) and (y>0)
k=2;
if (x>0) and (y<0)
k=4;
if (x>0) and (y>0)
k=1;
if (x=0) and ((y<0) or (y>0))
k=5;
if k=0
{
cout <<"Ushbu nuqta OX o`qiga tegishli! "
}
else
{
if k=5
cout <<"Ushbu nuqta OY o`qiga tegishli! "
else
cout <<"Ushbu nuqta" <<k<<"-chorakka tegishli! ";
}
}

```

```
system("PAUSE");  
return 0;  
}
```

2.20-masala. Koordinatalari berilgan $M1(X1, Y1)$ va $M2(X2, Y2)$ nuqtalarning qaysi biri koordinata boshiga yaqin turadi?

C++ da dasturu:

```
#include<iostream.h>  
Int main()  
{  
Float x1,y1,x2,y2,r1,r2;  
cout<<"x1=";<<cin>>x1;  
cout<<"y1=";<<cin>>y1;  
cout<<"x2=";<<cin>>x2;  
cout<<"y2=";<<cin>>y2;  
r1=sqrt(x1*x1+y1*y1);  
r2=sqrt(x2*x2+y2*y2);  
if (r1>r2)  
{  
cout <<"M2 nuqta yaqin turadi! "  
else  
{  
if (r1<r2)  
cout <<"M1 nuqta yaqin turadi! "  
else  
cout <<"Ikkala nuqta bir xil uzoqlikda turadi! ";  
}  
system("PAUSE");  
return 0;  
}
```

2) Quyidagi topshiriqlarni algoritm, blok-sxemasi va dasturini Borland c++ dasturlash tilida tuzing:

1	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 1$ $1 \leq x \leq 2,5$ $x > 2,5$
2	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$x \leq 2,1$ $2,1 < x \leq 4$ $x > 4$
3	$y = \begin{cases} 1 + \sin x^2 - 2 \\ \operatorname{tg} \sqrt{x^2 + 1} + \sin x \\ \operatorname{arcsin}(\cos(x^3 + 1)) \end{cases}$	$x \leq 1,5$ $1,5 \leq x \leq 10$ $x > 10$
4	$y = \begin{cases} \ln ax^2 + b \\ e^{\sqrt{x^3 + b}} + \lg x^3 \\ e^x + \lg(ab + 1) \end{cases}$	$x \leq a$ $a < x \leq b$ $x > b$
5	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$x \leq 2,1$ $2,1 < x \leq 4$ $x > 4$
6	$y = \begin{cases} \sqrt{e^{2x-1}} + \cos x \\ \sqrt{x^2 + 1} + \sin x \\ 5,6 + \ln \frac{x}{x + 5} \end{cases}$	$x < 1$ $1 \leq x \leq 2$ $x > 2$
8	$y = \begin{cases} e^{1 + 2,6 + \ln x^3 } \\ \operatorname{tg}^2(x^3 + 3,5) \\ \sin^3\left(\sqrt{x + \frac{2,7}{x}}\right) + \sqrt{\cos x} \end{cases}$	$x \leq 2,6$ $2,6 \leq x < 6$ $x \geq 6$
9	$y = \begin{cases} \operatorname{arcsin} \sqrt{x} + \cos x \\ e\sqrt{x^3 + ab} + \ln^2 x \\ \operatorname{tg}(ax^3 + bx) + \sqrt{\cos x} \end{cases}$	$x < a$ $a \leq x \leq b$ $x > b$

10	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 3$ $3 \leq x \leq 4,5$ $x > 4,5$
11	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 4$ $4 \leq x \leq 5,5$ $x > 5,5$
12	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$x \leq 3,1$ $3,1 < x \leq 5$ $x > 5$
13	$y = \begin{cases} 1 + \sin x^2 - 2 \\ \operatorname{tg} \sqrt{x^2 + 1} + \sin x \\ \operatorname{arcsin}(\cos(x^3 + 1)) \end{cases}$	$x \leq 2,5$ $2,5 \leq x \leq 12$ $x > 12$
14	$y = \begin{cases} \ln ax^2 + b \\ e^{\sqrt{x^3 + b}} + \lg x^3 \\ e^x + \lg(ab + 1) \end{cases}$	$x \leq a$ $a < x \leq b$ $x > b$
15	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$X \leq 3,1$ $3,1 < x \leq 6$ $x > 6$
16	$y = \begin{cases} \sqrt{e^{2x-1}} + \cos x \\ \sqrt{x^2 + 1} + \sin x \\ 5,6 + \ln \frac{x}{x + 5} \end{cases}$	$X < 2$ $2 \leq x \leq 4$ $x > 4$
17	$y = \begin{cases} e^{x^2-1} + \ln(x^2 + 1) \\ 0,25 \ln(x + 1) + \frac{1}{x + 1} \\ \frac{1}{1 + \cos x } + \sqrt{\cos x} \end{cases}$	$x < 1$ $1 \leq x \leq 2$ $x > 2$
18	$y = \begin{cases} e^{1 + 2,6 + \ln x^3 } \\ \operatorname{tg}^2(x^3 + 3,5) \\ \sin^3 \left(\sqrt{x + \frac{2,7}{x}} \right)^2 + \sqrt{\cos x} \end{cases}$	$x \leq 3,6$ $3,6 \leq x < 7$ $x \geq 7$

19	$y = \begin{cases} \arcsin \sqrt{x + \cos x} \\ e\sqrt{x^3 + ab} + \ln^2 x \\ \operatorname{tg}(ax^3 + bx) + \sqrt{\cos x} \end{cases}$	$x < a$ $a \leq x \leq b$ $x > b$
20	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 2$ $2 \leq x \leq 3,5$ $x > 3,5$
21	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 6$ $6 \leq x \leq 7,5$ $x > 7,5$
22	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$x \leq 3,1$ $3,1 < x \leq 6$ $x > 6$
23	$y = \begin{cases} 1 + \sin x^2 - 2 \\ \operatorname{tg} \sqrt{x^2 + 1} + \sin x \\ \arcsin(\cos(x^3 + 1)) \end{cases}$	$x \leq 3,5$ $3,5 \leq x \leq 13$ $x > 13$
24	$y = \begin{cases} \ln ax^2 + b \\ e^{\sqrt{x^3 + b}} + \lg x^3 \\ e^x + \lg(ab + 1) \end{cases}$	$x \leq a$ $a < x \leq b$ $x > b$
25	$y = \begin{cases} 3,2 + \ln x^2 + 1 \\ 10^{-3} + \operatorname{tg}(x^2 + 3,5) \\ 0,1 + \operatorname{arctg} \frac{x^3 + 1}{x^2 - 1} \end{cases}$	$x \leq 4,1$ $4,1 < x \leq 6$ $x > 6$
26	$y = \begin{cases} \sqrt{e^{2x-1}} + \cos x \\ \sqrt{x^2 + 1} + \sin x \\ 5,6 + \ln \frac{x}{x+5} \end{cases}$	$x < 2$ $2 \leq x \leq 4$ $x > 4$
27	$y = \begin{cases} e^{x^2-1} + \ln(x^2 + 1) \\ 0,25 \ln(x+1) + \frac{1}{x+1} \\ \frac{1}{1 + \cos x } + \sqrt{\cos x} \end{cases}$	$x < 0$ $0 \leq x \leq 2$ $x > 2$

28	$y = \begin{cases} e^{1+ 2,6+\ln x^3 } \\ \operatorname{tg}^2(x^3 + 3,5) \\ \sin^3\left(\sqrt{x + \frac{2,7}{x}}\right)^2 + \sqrt{\cos x} \end{cases}$	$x \leq 4,6$ $4,6 \leq x < 8$ $x \geq 8$
29	$y = \begin{cases} \arcsin \sqrt{x} + \cos x \\ e\sqrt{x^3 + ab} + \ln^2 x \\ \operatorname{tg}(ax^3 + bx) + \sqrt{\cos x} \end{cases}$	$x < a$ $a \leq x \leq b$ $x > b$
30	$y = \begin{cases} \sin(x^2 + 1) + \sqrt{\cos x} \\ \operatorname{tg}(x^3 + 1) + \sqrt{\sin x} \\ \operatorname{arctg}(\cos x) \end{cases}$	$x < 2$ $2 \leq x \leq 4,5$ $x > 4,5$

3. Siklik (Tokrorlanuvchi) algoritmlar

3.1- masala. $Y=X^2$ ning $[0,1]$ oraliqda 0,1 qadam bilan qiymatlar jadvalini aniqlang.

```
C++ da dasturu:  
#include<iostream.h>  
Int main()  
{  
float a,b,x,y,h;  
cout<<"a=";<<cin>>a;  
cout<<"b=";<<cin>>b;  
cout<<"h=";<<cin>>h;  
x=a;  
do  
{y=x*x;  
cout <<"x=" <<x;  
cout <<"y=" <<y;  
x=x+h;  
}  
while(x<=b);  
}
```

3.2- masala. $Y=3x^2 + 4x - 10$ funksiyaning X o'zgaruvchi

1). 0,1,2,3,4,5;

2). 0,3,6,9,12 ga teng qiymatlarini qabul qilgandagi ifodalari hisoblansin.

Yechish. Dastlab x o'zgaruvchi 0,1,2,3,4,5 qiymatlarni qabul qilgan hol uchun sikl operatoridan foydalanib dastur tuzamiz.

```
C++ da dasturu:  
#include<iostream.h>  
Int main()  
{  
Int a,b;  
Float n;  
Int s1[5],s2[5];  
cout<<"a=";<<cin>>a;  
cout<<"b=";<<cin>>b;  
cout<<"n=";<<cin>>n;  
x=a;  
repeat  
y=3*sqr(x)+4*x-10; str(x:1,%s1);str(y:5,%s2);  
cout <<"x=" <<s1;  
cout <<"y=" <<s2;  
x=x+n;  
until x>b;
```

```

system("PAUSE");
return 0;
}

```

3.3- masala. N natural son va X haqiqiy sonlar berilgan. Quyidagi yig'indini hisoblang.

$$\sin X + \sin^2 X + \dots + \sin^N X .$$

Yechish. Izlanayotgan yig'indini S bilan belgilaymiz.

C++ da dasturu:

```

#include<iostream.h>
#include<math.h>
Int main()
{
Int n,i;
Float x,s;
cout<<"n=";>>n;
cout<<"x=";>>x;
s=0; x=sin(x);
for(i=1;i<=n; i++)
s:=s+exp(i*ln(x));
cout <<"s=" <<s;
system("PAUSE");
return 0;
}

```

3.4- masala. N! Aniqlansin. Bunda N natural son.

Yechish. N<34 bo'lganda natural sonlar faktorialini hisoblash mumkin.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
int i,n;
int p;
cout<<"n=";>>n;
p=1;
for(i=1;i<=n;i++)
{
p=p*i
};
cout <<"p=" <<p;
system("PAUSE");
return 0;
}

```

3.5- masala. 1dan 20 gacha natural sonlar kvadratlari yig'indisini toping.

Yechish. Izlanayotgan yig'indini S bilan belgilaymiz.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
int i,n;
int s;
cout<<"n=";>>n;
s=0;
for(i=1;i<=n;i++)
{
s=s+i*i;
};
cout <<"s=" <<s;
system("PAUSE");
return 0;
}
```

3.6- masala. A sonining N darajasini takrorlash buyrug'i yordamida hisoblang.

Yechish. A sonning n – darajasiga teng kattalikni y bilan belgilaymiz.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
int i,n,a;
int y;
cout<<"a=";>>a;
cout<<"n=";>>n;
y=1;
for(i=1;i<=n;i++)
y=y*a;
cout <<"y=" <<;
system("PAUSE");
return 0;
}
```

3.7-masala. 1 dan 10 gacha bo'lgan sonlardan sikl qadami 1 ga teng holda kvadrat ildiz chiqaring.

Yechish. Berilgan x sonidan chiqarilgan kvadrat ildizning qiymatini y bilan belgilaymiz. $y = \sqrt{x}$

C++ da dasturu:

```

#include<iostream.h>
#include<math.h>
Int main()
{
int a,b,i;
float y;
cout<<"a=";>>cin>>a;
cout<<"b=";>>cin>>b;
for(i=a;i<=b;i++)
{
y=sqrt(i);
cout <<"i=" <<i;
cout <<"y=" <<y;
};
system("PAUSE");
return 0;
}

```

3.8-masala. 1 dan 9 gacha bo'lgan sonlarni ko'paytirish jadvalini ekranga chiqaring.

Yechish. Bu masalani yechish uchun 3 marta sikl buyrug'idan foydalanamiz. Birinchi siklda birinchi ko'paytuvchi 1 dan 3 gacha, ikkinchisi esa, 1 dan 9 gacha o'zgaradi. Ikkinchisi siklda birinchi ko'paytuvchi 4 dan 6 gacha, ikkinchisi esa, 1 dan 9 gacha o'zgaradi. Uchinchi siklda birinchi ko'paytuvchi 7 dan 9 gacha, ikkinchisi esa, 1 dan 9 gacha o'zgaradi.

C++ da dasturu:

```

#include<iostream.h>
Int main()
{
int a,b,i,j;
int y;
cout<<"a=";>>cin>>a;
cout<<"b=";>>cin>>b;
for(i=a;i<=b;i++)
{
for(j=1;j<=10;j++)
{
y=i*j;
}
cout <<"i*j=" <<y;
}
system("PAUSE");
return 0;
}

```

3.9-masala. L nomerli Fibonachchi sonini ekranga chiqaring. Yechish. 1,1,2,3,5,8,13,21,34,...sonlar Fibonachchi sonlar ketma-ketligini ifodalaydi. Bu sonlar ketma-ketligida uchinchi hadidan boshlab har bir son o'zidan oldingi ikkita sonning yig'indisiga teng.

```
C++ da dasturu:
#include<iostream.h>
Int main()
{
int i,w,v,r,n;
w=0; v=1; i=1;
cout<<"n=";>>n;
while (i<n)
{
r=w+v; w=v; v=r;
i=i+1;
};
cout <<"v=" <<v;
system("PAUSE");
return 0;
}
```

3.10-masala. $y = e^x = 1 + x + \frac{x^2}{2!} + \dots + \frac{x^N}{N!} + \dots$ funksiyaning qiymatini 0,001 aniqlikda hisoblang.

```
C++ da dasturu:
#include<iostream.h>
Int main()
{
float x,eps,s,p;
int n;
cout<<"eps=";>>eps;
cout<<"x=";>>x;
s=1;p=1;n=1;
do
{
p=p*x/n; s=s+p;
n=n+1;
}
while(abs(p)>eps);
cout <<"s=" <<s;
system("PAUSE");
return 0;
}
```

```
}
```

3.13-masala. N natural son va A haqiqiy son berilgan. Quyidagi ko'paytmani hisoblang:

$$A(A+1)(A+2) \dots (A+N)$$

Yechish. Berilgan ko'paytmani k bilan belgilaymiz.

C++ da dasturu:

```
#include<iostream.h>
Int main()
{
int n,i;
float a,p;
cout<<"n=";<<cin>>n;
cout<<"a=";<<cin>>a;
p=1;
for (i=0; i<=n; i++)
p=p*(a+i);
cout <<"p=" <<p;
system("PAUSE");
return 0;
}
```

3.14-masala. Darajaga ko'tarish amalini bajarmay, ushbu yig'indini hisoblang:

$$S = \sum_{n=1}^{10} (-1)^n n^2$$

Yechish. Bu masalani yechishda $(-1)^n$ ni hisoblash uchun yangi o'zgaruvchi $a=1$ ni kiritamiz. Uning har galgi qiymatini -1 ga ko'paytiramiz.

C++ da dasturu:

```
#include<iostream.h>
#include<math.h>
Int main()
{
Float s;
Int n,c;
s=0;c=-1
For(i=1;i<=n;i++)
s=s+pow(c,i)*sqr(i);
cout <<"s=" <<s;
system("PAUSE");
return 0;
}
```

3.15-masala. Natural sonni tub ko'paytuvchilarga ajrating.

C++ da dasturu:

```

#include<iostream.h>
#include<math.h>
Int main()
{
int n,i,a;
cout<<"n=";>>cin>>n;
for (i=1;i<=n;i++)
{
a=n%i;
if ((n % i)=0)
{
    cout <<"i=" <<i;
Memo1->Lines->Add(IntToStr(i));
}};
    system("PAUSE");
    return 0;

}

```

Takrorlanuvchi jarayonlarni algoritmlari va dasturlash.

Topshiriq: a) Quyidagi topshiriqlar algoritm, blok-sxemasini va dasturini Paskal dasturlash tilida tuzing.

№	Funksiyani qiymatini hisoblash uchun algoritm va dastur tuzing.	Yig`indini hisoblash uchun algoritm va dastur tuzing.	Cheksiz qatorni 0,005 aniqlikda hisoblash algoritmi va dasturini tuzing
1	$Y = a^3 \sin x^2$ $\Delta X = 0.1; -1 \leq X \leq N$	$S = \sum_{i=4}^N \frac{0.4}{i(i+1) + \sqrt{i}}$	$Z = \sum_{i=1}^{\infty} \frac{1}{i(i+1) + 2 \cos i}$
2	$Y = \sqrt{a} \cos x$ $\Delta X = 0.2; 5 \leq X \leq N$	$S = \sum_{i=1}^N \frac{\cos i}{i^2 + 5}$	$Z = \sum_{i=2}^{\infty} \frac{1}{i^2 + 5 + \ln i}$
3	$Y = a^{\frac{1}{3}} \operatorname{tg} x$ $\Delta X = 0.1; 2 \leq X \leq N$	$S = \sum_{i=4}^N \frac{5 + e^j}{6j + 2,7}$	$Z = \sum_{i=1}^{\infty} \frac{5}{6i^4 + 2.7 + \sqrt{i}}$
4	$Y = 2 + a \ln x$ $\Delta X = 0.2; -3 \leq X \leq N$	$S = \sum_{i=5}^N \frac{1}{\ln i + 1.7}$	$Z = \sum_{i=3}^{\infty} \frac{1}{\ln i + i^2}$
5	$Y = 3.2a \sqrt{x+1}$ $\Delta X = 0.5; 1 < X < N$	$S = \sum_{x=1}^N \frac{1}{\sqrt{K} + 1.2}$	$Z = \sum_{K=1}^{\infty} \frac{4}{3k^3 + \sin K}$
6	$Y = 5e^{xa} + 2.3$ $\Delta X = 0.3; 0 \leq X \leq N$	$S = \sum_{i=1}^N \frac{1}{2e^i + 3.4}$	$Z = \sum_{i=1}^{\infty} \frac{1}{2e^i + \operatorname{tg}^i}$
7	$Y = ax^3 + 2.4e^x$ $\Delta X = 0.4; -5 \leq X \leq N$	$S = \sum_{j=2}^N \frac{\sqrt{5.4}}{3j^3 + j^{\frac{1}{3}}}$	$Z = \sum_{K=1}^{\infty} \frac{4}{3k^3 + \sin K}$
8	$Y = e^{ax} + 2,1x$ $\Delta X = 0,2; -2 \leq x \leq N$	$S = \sum_{x=5}^N \frac{1}{1 + \ln^2 x}$	$Z = \sum_{J=1}^{\infty} \frac{8}{\sqrt{J} + J^4}$
9	$Y = \operatorname{tg} ax + \sqrt{x}$ $\Delta X = 0,3; -0,3 \leq X \leq N$	$S = \sum_{L=2}^N \frac{1 +}{\sqrt{5} + L^2}$	$Z = \sum_{J=1}^{\infty} \frac{\ln j}{j^6}$
10	$Y = e^{ax} - e^{ x }$ $\Delta X = 0,5; -0,5 \leq x \leq N$	$S = \sum_{i=1}^N \frac{\cos^2 i}{i^3}$	$Z = \sum_{i=1}^{\infty} \frac{3,4}{e^{2i}}$
11	$Y = \frac{a + 0,27}{x + \sqrt{1+x}}$ $\Delta X = 0,8; -0,9 \leq X \leq N$	$S = \sum_{i=1}^N \frac{(-1)^i}{i + \operatorname{tgi}}$	$Z = \sum_{i=3}^{\infty} \frac{1}{i^i + 2,7}$
12	$Y = \frac{\sqrt{1+x+0,3}}{a^2 x}$ $\Delta X = 0,3; 0 \leq x \leq N$	$S = \sum_{i=3}^N \frac{3}{(-1)^i + 2i^2}$	$Z = \sum_{j=1}^{\infty} \frac{\sqrt{j}}{1 + j^6}$
13	$Y = \sin ax + e^a$ $\Delta X = 0,9; -2 \leq X \leq N$	$S = \sum_{i=1}^N \frac{35}{\sqrt{i} + \sqrt{i}}$	$Z = \sum_{i=2}^{\infty} \frac{3}{i + 2\sqrt{i}}$
14	$Y = a + e^x + \cos x$ $\Delta X = 0,4; -0,8 \leq x \leq N$	$S = \sum_{i=2}^N \frac{e^i + 1}{i}$	$Z = \sum_{K=1}^{\infty} \frac{k}{e^x + k^2}$
15	$Y = a^2 \sqrt{\sqrt{x+1} + 2}$ $\Delta X = 0,4; 0,3 \leq X \leq N$	$S = \sum_{i=1}^N \frac{1}{ \cos i - i}$	$Z = \sum_{x=1}^{\infty} \frac{0,7}{2 + \ln k }$

16	$Y = \cos ax + \sin a$ $\Delta X = 0,3; 0,1 \leq x \leq N$	$S = \sum_{i=5}^N \frac{1}{\cos i + \sin i}$	$Z = \sum_{i=1}^{\infty} \frac{67}{i^4 + \sqrt{3i}}$
17	$Y = 2,7a^4 + \ln x^2$ $\Delta X = 0,2; -1 \leq X \leq N$	$S = \sum_{j=1}^N \frac{2,7}{\ln j^3 + 1}$	$Z = \sum_{i=6}^{\infty} \frac{ \cos i }{i^2}$
18	$Y = 35,9a^4 \sin x^2$ $\Delta X = 0,1; 0 \leq x \leq N$	$S = \sum_{x=3}^N \frac{k + 0,4}{\sqrt{k + \sqrt{k}}}$	$Z = \sum_{j=1}^{\infty} \frac{0,4}{\sqrt{j + 100}}$
19	$Y = \sqrt{a + 2 \ln x^3}$ $\Delta X = 0,4; 0,02 \leq X \leq N$	$S = \sum_{x=1}^N \frac{0,999k}{k^2 + k^{0,7}}$	$Z = \sum_{i=3}^{\infty} \frac{2,4}{ i + e^{i+1}}$
20	$Y = \sqrt{a + 2,1 \ln x^3}$ $\Delta X = 0,4; 0,02 \leq x \leq N$	$S = \sum_{x=1}^N \frac{k + 1}{k^2 + 2}$	$Z = \sum_{L=1}^{\infty} \frac{100}{L^2 + \ln L }$
21	$Y = e^{ax} \lg x + 3$ $\Delta X = 0,3; -0,05 \leq X \leq N$	$S = \sum_{i=1}^N \frac{0,4i}{i \cos i + 3i}$	$Z = \sum_{x=1}^{\infty} \frac{ \cos k + \sin k }{k}$
22	$Y = e^{ax} + 2,91x$ $\Delta X = 0,1; 1 \leq x \leq N$	$S = \sum_{i=2}^N \frac{\sqrt{i+2}}{3i}$	$Z = \sum_{j=1}^{\infty} \frac{0,9}{e^{j+2} + 1}$
23	$Y = \cos^2(2x + a)$ $\Delta X = 0,2; 0,04 \leq X \leq N$	$S = \sum_{x=1}^N \frac{\sqrt{ \cos k }}{k}$	$Z = \sum_{i=1}^{\infty} \frac{0,4}{\sqrt{i^3 + 1}}$
24	$Y = 3 \ln^2(ax^2 + 3)$ $\Delta X = 0,04; 0,4 \leq x \leq N$	$S = \sum_{j=1}^N \frac{0,9}{\sqrt{j^2 + \sqrt{1+j}}}$	$Z = \sum_{i=5}^{\infty} \frac{e^{0,4}}{\ln i^2}$
25	$Y = 0,2ax^2 \lg \frac{x}{a}$ $\Delta X = 0,1; 0,1 \leq X \leq N$	$S = \sum_{x=1}^N \frac{\frac{1}{k^3}}{k^3 + \sin k}$	$Z = \sum_{i=1}^{\infty} \frac{2,4 + i}{i^i + 2}$
26	$Y = ax^2 + \sin \pi x$ $\Delta X = 0,03; 0,03 \leq x \leq N$	$S = \sum_{x=2}^N \frac{(-1)^{x+1}}{k + \sqrt{0,2k}}$	$Z = \sum_{x=1}^{\infty} \frac{k}{\ln k^5}$
27	$Y = \frac{ax^2 3x + 1}{x}$ $\Delta X = 0,04; 1 \leq X \leq N$	$S = \sum_{i=1}^N \frac{i(i+2)}{i + \sqrt{i+1}}$	$Z = \sum_{x=3}^{\infty} \frac{0,5k}{k^3 + e^x}$
28	$Y = \frac{\sin x}{a \pi x} + 0,4$ $\Delta X = 0,4; 0,08 \leq X \leq N$	$S = \sum_{i=1}^N \frac{\sin(\pi i)}{i^2}$	$Z = \sum_{j=5}^{\infty} \frac{0,9}{e^{j+3} + 3,4}$
29	$Y = a^{\frac{1}{6}} e^{x^2}$ $\Delta X = 0,25; -2 \leq x \leq N$	$S = \sum_{i=3}^N \frac{\cos(\pi i)}{\pi i}$	$Z = \sum_{x=1}^{\infty} \frac{99k}{k^3 + \sqrt{k+k^4}}$
30	$Y = \cos \pi ax + \sin \pi ax$ $\Delta X = 0,5; -3 \leq x \leq N$	$S = \sum_{i=1}^N \frac{0,45}{\cos i + \sin i}$	$Z = \sum_{x=1}^{\infty} \frac{0,49}{\sqrt[4]{k + 0,27 + k}}$

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Mundarija

1. Soʻz boshi.....	4
2. Chiziqli dasturlash algoritmi.....	5
3. Tarmoqlanuvchi algoritmlar	16
4. Siklik (Tokrorlanuvchi) algoritmi.....	33
5. Foydalanilgan adabiyotlar.....	42
6. Mundarija	43

