***S e s a v a l i***

იმისათვის, რომ კომპიუტერმა შესძლოს გამოთვლების განხორციელება, საჭიროა ალგორითმი წარმოდგენილი იქნას მისთვის გასაგებ ენაზე. დასმული ამოცანის გადაჭრის მიზნით პროგრამისტები ახორციელებენ ალგორითმის ჩაწერას დაპროგრამების სხვადასხვა ენებზე, ალგორითმულ ენებზე.

***a l g o r i T m i***

***algoriTmi aris wesi, romelsac დასმული ამოცანის Sesruleba dayavs martivi moqmedebებis Sesrulebaze***. ***ალგორითმი წარმოადგენს ბრძანებათა ერთობლიობას კონკრეტული ამოცანის შესასრულებლად.***

1. ***dawyeba-dasrulebis bloke*** –





1. ***Setanis da gamotanis bloki*** –





1. ***moqmedebis (gamoTvlis)*** bloki –



1. ***pirobis bloki*** - 



1. ***SemaerTebeli*** – 



1. ***SemaerTebeli*** ***xazebi*** –

***daprogramebis ena C++***

obieqtze orientirebuli daprogramebis ena **C++** warmoadgens algoriTmuli ena **C-**s gafarToebas.

ჩვენ გამოვიყენებთ **Borland C++**

***operaciebi***

|  |  |
| --- | --- |
| **maTematikuri operaciebi:**   1. Sekreba - `+~ 2. gamokleba - `-~ 3. gamravleba - `\* ~ 4. gayofa - `/ ~ 5. gayofiT miRebuli   naSTis povna `% ~ | **Sedarebis operaciebi:**   1. a=b - a==b 2. a≠b - a!=b 3. a>b - a>b 4. a≥b - a>=b 5. a<b - a<b 6. a≤b - a<=b |

**logikuri operaciebi**

* `&&~ - logikuri `da~ anu koniuqcia. Sedegi WeSmaritia, roca yvela operandi WeSmaritia. ( X>0 && X<10)
* `II~ - logikuri `an~ anu diziunqcia. Sedegi WeSmaritia, roca operandebidan erT-erTi WeSmaritia. ( X>0 II X<=10)
* `! ~ logikuri `ara~ uaryofa, romelic cvlis Tavis operandis mniSvnelobas sawinaaRmdego mniSvnelobiT.

( ! (X>0) Sedegi X≤0)

**miniWebis operacia**

|  |  |  |  |
| --- | --- | --- | --- |
| operacia | nimuSi | ganmarteba | Sedegebi |
| + = | X+=9 | X=X+9 | X= 12 |
| \_ = | X-=1 | X=X-1 | X=2 |
| \*= | X\*=2 | X=X\*2 | X=6 |
| /= | X/=3 | X=X/3 | X=1 |
| %= | X%=2 | X=X%2 | X=1 |

***inkrementisa da dekrementis operaciebi***

***inkrementis*** operacia **mag X++ an ++X**

***mag. X=3; Y=++X+2; Y=6***

***mag. X=3; Y=X++ +2; Y=5***

***dekrementis*** operacia. **mag X- - an – X**

***მaTematikuri funqciebi***

|  |  |
| --- | --- |
| *sinx – sin(x)*  *cosx – cos(x)*  *tgx – tan(x)*  *arcsinx– asin(x)*  *arccosx – acos(x)*  *arctgx – atan(x)*  *-- sqrt(x)*  *Xy – pow(x,y)* | *ex – exp(x)*  *|x| – fabs(x)*  *Lnx – log(x)*  *floor(x)* – x-is damrgvaleba naklebobiT momdevno mTel ricxvamde, romelic x-ze naklebia  *ceil (x)* – x-is damrgvaleba metobiT momdevno mTel ricxvamde romelic x-ze metia. |

***specialuri simboloebi***

|  |  |
| --- | --- |
| *\a* | *signalis (zaris) simbolo* |
| *\b* | ***dabrunebis simbolo*** |
| *\r* | ***striqonis TavSi gadayvanis simbolo*** |
| *\n* | ***axali striqonze gadasvlis simbolo*** |
| *\t* | ***horizontaluri tabulaciis simbolo*** |
| *\v* | ***vertikaluri tabulaciis simbolo*** |
| *\’* | ***calmagi brWyali (apostrofi)*** |
| *\”* | ***ormagi brWyali*** |

am simboloebis gamoyenebisas unda moxdes maTi ganTavseba calmxriv brWyalebSi an ormag brWyalebSi, Tu viyenebT maT striqonis SigniT.

***laboratoriuli samuSao #1***

***programis operatorebi***

* ***#incluade operatori***
* ***void main ()******operatori***
* ***cout gamotanis da******(<<)******Casmis operatori***

***// მაგ. pirveli***

***#include <iostream.h>***

***void main()***

***{***

***cout<<“ჩვენი საყვარელი რიცხვია“ << 1001;***

***}***

***// მაგ. meore***

***#include <iostream.h>***

***void main()***

***{***

***cout<<”რიცხვი ” << 1001<<“ მე ძალიან მომწონს“;***

***}***

***.***

***მაგ.1***

***#include <iostream.h>***

***void main()***

***{***

***cout<<” saqarTvelos teqnikuri universiteti \n informatikis fakulteti ”;***

***}***

***მაგ. 3***

***#include <iostream.h>***

***void main()***

***{***

***cout<<”axla ki …..“<<endl<<”ვსწავლობთ დაპროგრამების ენა C++”;***

***}***

***მაგ. 2***

***#include <iostream.h>***

***void main()***

***{***

***cout<< 1<< ‘ \n’<< 0 << ’ \n’ << 0 << ’\n’ << 1 ;***

***}***

***labortoriuli #1-is davaleba***

***gamotanis cout operatori***

***dav. 1*** *gamotanis (cout) operatoris gamoyenebiT dawereT programa, romelsac gamoaqvs ekranze Semdegi frazebi:*

` ***hello world***

***ai programa, romelic cout-is gamoyenebis ilustracias iZleva~***

***dav. 2*** *gamotanis (cout) operatoris gamoyenebiT dawereT programa, romelsac gamoaqvs ekranze Semdegi frazebi:*

***`saqarTvelos teqnikuri universitetis***

***informaciuli teqnologiebis specialobis***

***#..................... jgufis***

***student..............................................***

***20----- weli~***

***dav. 3*** *gamotanis (cout) operatoris gamoyenebiT dawereT programa, romelsac gamoaqvs ekranze Semdegi frazebi:*

***`Tbilisi …***

***teqnikuri universiteti***

***informatikis fakulteti~***

***laboratoriuli samuSao #2***

***wrfivi gamoTvliTi procesis daprogrameba***

***wrfivi struqturis SemTxvevaSi yoveli momdevno brZaneba mkacrad sruldeba wina brZanebis Sesrulebis Semdeg.***

programebi iyeneben cvladebs. cvladebi arsebobs : ***ricxviTi****,* ***simboluri, logikuri***

**mTeli tipis cvladebi, romlebic warmoadgenen mTel ricxvebs wilad nawilis gareSe**

* Int tipis – inaxeba mTeli ricxvebi diapazonSi -32768-dan 32767-mde
* long tipis – inaxeba mTeli ricxvebi diapazonSi -2147483648-dan 2147483647-mde

**cvladebi mcocavi wertiliT (aTwiladi ricxvebi)**

* float tipis – inaxeba dadebiTi da uaryofiTi aTwiladi ricxvebi diapazonSi 3,4\*10-38-dan 3,4\*1038-mde.
* double tipis –inaxeba dadebiTi da uaryofiTi aTwiladi ricxvebi diapazonSi 1,7\*10-308-dan 1,7\*10308-mde.

**simboluri tipis cvladebi**

* char mniSvnelobebi -128-dan 127-mde. Cveulebriv gamoiyeneba alfabetis asoTa Sesanaxad.

*programaSi unda aRiweros yvela cvladi. jer unda miuTiToT cvladis saxeli da tipi (int), Semdeგ konkretuli mniSvneloba ( 5 )* ***mag: int a=5***

***konstanta*** (mudmiva) ewodeba sidides, romlis mniSvneloba ar icvleba programis Sesrulebis procesSi.

konstantebi programirebaSi gamoyenebamde unda gacxaddes, sadac gamoiyeneba koduri sityva ***const***,

mag: ***const float pi***=3.141

***const int A***=5

***SevadginoT mocemuli gamosaxulebis gamoTvlis programa***

***c=cos2(2x+1) – e!x-a! x=0,25 a=1,4***

***programa:***

***#include<iostream.h>***

***#include<math.h>***

***main()***

***{***

***double x=0.25 , a=1.4, z,c;***

***z=(2\*pow(x,3) – sqrt(a\*pow(x,2)+exp(x)))/(2\*a);***

***c=pow(cos(2\*x+1),2) –exp(abs(x-a));***

***cout<<”z=”<<z<<endl;***

***cout<<”c=”<<c<<endl;***

***}***

***algoriTmi***

dasawyisi



***x=0.25 ,a=1.4***



***c=cos2(2x+1) – e!x-a!***





Z=

C= 

dasasruli

***pasuxi:***

*x=0.25*

*a=1.4*

*z=*

*c=*

***labortoriuli # 2-is davalebebi***

***SeadgineT mocemuli gamosaxulebebis programa***

|  |  |  |
| --- | --- | --- |
| *#* | *gamosaxulebebi* | *sawyisi monacemebi* |
| *1* |  | *B =3,64; C = 0,6; x = 0,5.* |
| *2* | *Z= y3 – 2\*y2 – y + 1;* | *A=8; B = 2; C=2; x = 1.* |
| *3* | *Z= y2 – y ;* | *A=3,1; B = 2,4; C = 1,1; x = 1,2* |
| *4* |  | *B = 0,5; C = 1;*  *x = 2,5.* |
| *5* | *Z= y2 – x ;* | *x = 0,8.* |
| *6* |  | *A=0, 3; x = 0,7.* |
| *7* | *Z= y2 – 5;* | *A=7;*  *x = 1,5.;* |
| *8* | *Z= y3 – 1;* | *A=5; x = 3.* |
| *9* |  | *A=10; B = 3,4; x = 2* |
| *10* |  | *A=1,5; x = 2.* |
| *11* |  | *B=1,5; x = 0,5.* |
| *12* |  | *A=10;*  *x = 1,5.* |
| *13* | + 1); Yy = | *B=5; x = 1,3* |
| *14* | ; | *A=2;*  *B= 1; x = 0,5.* |
| *15* |  | *B = - 1; x = 1,5.* |

***laboratoriuli samuSao #3***

***wrfivi gamoTvliTi procesis daprogrameba.***

***komentari da Setanis operatori cin***

*programaTa Seqmnisas SegiZliaT sawyis fa-ilSi movaTavsoT SeniSvnebi anu* ***komentarebi*** *, romlebic ganmartavs programis muშaobas. komentars svaven sleSis* ***( // )*** *niSanSi.* ***mag. 1:*** ***davweroT myidvelisTvis xur-dis dabrunebis programa***

***programa***

*#include <iostream.h>*

*main ()*

*{*

*float R=15.50 ; // navaWris Rirebuleba*

*float G ; // gayidvis gadasxadi 6% (0.06)*

*float F = 20.00; // myidvelis fuli*

*float K ; // gayidvis gadasaxadi*

*float X; // dasabrunebeli xurda*

*// myidvelis dasabrunebeli xurda da saerTo angariSi*

*G G= R \* 0.06;*

*K = R + G;*

*X = F – X;*

cout<< ” navaWris Rirebuleba : $ ” << R << “ \ t *gadasaxadi* : $ “ << G*<< “ \ tsaerTo angariSi :*  $ “ << K << endl ;

cout<<” xurda myidvelisaTvis : $ ” << X << endl;

}

*monacemTa Setana klaviaturis saSualebiT**xorcieldeba brZanebiT*

***mag: cin>>******monacemebi***

**cin>>k;**

**გამოვთვალოთ ფირმის ხარჯები. შეგვაქვს ბიუჯეტი და გამოვთვალოთ ხარჯები -**

**სოც დახმ. 10%, რეკლ. 30%, ხელფას. 50%, მოგება 10%.**

#include <iostream.h>

#include <math.h>

void main ()

{

float b, soc, rekl, xelfasi, mogeba;

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

soc=b\*0.1;

rekl=b\*0.3;

xelfasi=b\*0.5;

mogeba=b\*0.1;

cout << "soc="<< soc<< endl;

cout <<"rekl="<< rekl<< endl;

cout <<"xelfasi="<< xelfasi<<endl;

cout <<”mogeba=”<<mogeba<<endl;

}

***SevadginoT mocemuli gamosaxulebis gamoTvlis programa cin operatoris gamoyenebiT***

***c=cos2(2x+1) – e!x-a! k=1,2 a=2,8***

***programa:***

*#include<iostream.h>*

*#include<math.h>*

*main()*

*{*

*double x,k, z,a,c;*

cout<<” x=” ; cin>>x;

cout<<” a=” ; cin>>a;

*z=(2\*pow(x,3) – sqrt(a\*x\*x+exp(x)))/(2\*a);*

*c=pow(cos(2\*x+1),2)- exp(abs(x-a));*

*cout<<”z=”<<z<<endl;*

*cout<<”c=”<<c<<endl;*

*}*

***algoriTmi***

dasawyisi



SemoitaneT*x , α*



*c=cos2(2x+1) – e!x-a!*





Z=



dasasruli

***pasuxi:***

*x=1.2*

*a=2.8*

*z=*

*c=*

***labortoriuli # 3-is davalebebi***

*SeadgineT mocemuli gamosaxulebebis gamoTvlis programa* ***cin*** *operatoris gamoyenebiT*

|  |  |  |
| --- | --- | --- |
| *#* | ***gamosaxulebebi*** | ***sawyisi monacemebi*** |
| *1* |  | *B=0,28 ; c=2,5 x = 0,47.* |
| *2* | *Z= ln(y + 5,5);* | *c=4,5;*  *B = 0,25; x = 1,1.* |
| *3* |  | *B = 0,25; x = 0,6; c=-0,5* |
| *4* |  | *B = 1,97; C = 0,3;*  *x = 0,5.* |
| *5* | *Z= sin(y2 +1) ;* | *x = 0,5; B=2,21; c=-1,1.* |
| *6* |  | *x = 0,2.*  *B=0,36 ; C=-0,6* |
| *7* | *Z= y2 +y- 3;* | *B = 2; C = 1; x = 2.* |
| *8* | *Z= y2 –y+4;* | *A=7; x = 0,8.*  *B=1,5; C=0,8* |
| *9* |  | *A=4; B = 1,5; x = 2* |
| *10* |  | *x = 2.*  *B=2; c=1* |
| *11* |  | *B=1,36; x = 1,1.*  *A=14; c=0,216* |
| *12* |  | *A=3; x = 0,5.*  *B=0,95;*  *c = 1,8* |
| *13* | + Ax; y = ( | *A=0,5; x = 1,2* |
| *14* | -1)\*sinx; | *A=2; B = 1; x = 0,5.* |
| *15* |  | *B = -1,1; x = 0,5.* |

***laboratoriuli samuSao #4***

***martivi ganStoebadi gamoTvliTi procesis daprogrameba***

yvela martivi proგrama asrulebs operaciebs TanmimdevrobiT \_ pirvelidan programis bოlomde..

programaSi arsebuli brZanebebis Sesrulebis Tanmimdevrobis Secvla gamomdinare ama Tu im pirobidan, iwvevs masSi erTgvar ganStoebas.

arsebos ganStoebadi struqturis ganxorcielebis sami SesaZlebloba:

1. ***amorCevis struqtura* if**(Tu);
2. ***amorCevis struqtura*** **if/else** (Tu/ winaaRmdeg SemTxvevaSi);
3. ***amorCevis struqtura*** **swich**(amorCeva);

**amorCevis struqtura if (**Tu**)**

**if** operatori saSualebas iZleva SevasruloT esa Tu is moqmedeba, mxolod im SemTxvevaSi, Tu dasmuli piroba WeSmaritia. aRniSnul operatorSi wertil-mZimis dasma pirobis Semdeg sintaqsur Secdomad iTvleba.

***If struqturis sqematuri saxea:***

ki ara

piroba

moqmedeba





***If struqturis Caweris saxe Semdegia*:**

***If (piroba)***

***{***

***brZanebebi;***

***}***

***m a g a l i T e b i***

1. *davadginoT “****dadebiTia”*** *Tu ara mocemuli ricxvi*
2. *davadginoT ”****uaryofiTia”*** *Tu ara mocemuli ricxvi*

***algoriTmebi:***

**1**  dasawyisi **2** dasawyisi



SemoitaneT ***x*** SemoitaneT ***x***



ara ara

ki X>0 ki X<0 

dadebiTia uaryofiTia





dasasruli dasasruli

***programa programa***

***#include <iostream.h> #include <iostream.h>***

***void main() void main()***

***{ {***

***float x; float x;***

***cout<<"x="; cout<<"x=";***

***cin>>x; cin>>x;***

***if (x>0) if (x<0)***

***{ {***

***cout <<"x dadebiTia" <<endl; cout <<"x uaryofiTi";***

***}***

***}***

***pasuxi:***

***x* =**

***pasuxi:***

***x=***

***} }***

***laboratoriuli # 4-is davalebebi***

*SeadgineT mocemuli gamosaxulebebis gamoTvlis programa*

|  |  |  |
| --- | --- | --- |
| *#* | *gamosaxulebebi* | *sawyisi monacemebi* |
| *1* |  | c=1,2  X=1.79 |
| *2* |  | X=1,52 |
| *3* | Z=|AB|, | X=2,7 |
| *4* |  | X=2,97 |
| *5* |  | X=8,17  A=2.06 |
| *6* |  | *B = 3,15;*  *Z= 2,66* |
| *7* |  | *X = 2;*  *A = 2,8;*  *B = -4,2;*  *C = 8* |
| *8.* |  | *X = 12;*  *A = 1,2;*  *C = 1,81* |

|  |  |  |
| --- | --- | --- |
| *#* | *gamosaxulebebi* | *sawyisi monacemebi* |
| *9* | *A=cosx\*sin(*  *;* | *X = 4,3;*  *B = 10;* |
| *10* | *0,1\*tg ;* | *X=3,18* |
| *11* |  | *X=2,3*  *C=1,2* |
| *12* |  | *X=2,835* |
| *13* |  | *C=81,7* |
| *14* |  | *X=1,01* |
| *15* | *A* | *X=2,3* |

***laboratoriuli samuSao #5***

**martivi ganStoebadi gamoTvliTi procesisi daprogrameba**

***amorCevis struqtura if/else (****Tu/ winaaRmdeg SemTxvevaSi****)*** *saSualebas gvaZlevs ori SesaZlo alternatiuli variantidana avirCioT erT-erTi.*

***if/else*** *struqturis moqmedebis principi Semdegia:*

*mowmdeba piroba, romelic mosdevs* ***if*** *operators da Tu piroba WeSmaritia sruldeba `brZaneba I ~ da ar sruldeba `brZaneba II ~, Tu mcdaria sruldeba `brZaneba II ~ da ar sruldeba `brZaneba I.~*

*Tu I da II brZanebebi Sedgeba TiTo brZanebisagan, figuruli frCxilebis gamoyeneba savaldebulo ar aris.*

*pirobis Semdeg wertil-mZimis dasma dauSvebelia da iTvleba sintaqsur Secdomad.*

***If/else struqturis sqematuri saxe:***



ki ara

piroba

brZanebaI brZanebaII



***If/else struqturis Caweris saxe Semdegia*:**

***If (piroba)***

***{***

***brZanebebi -I;***

***}***

***else***

***{***

***brZanebebi -II;***

***}***

***magaliTi*** *: SevadginoT mocemuli gamosaxulebis gamoTvlis programa*

Tu x2

Tu x2

*z=2,3* y=

***algoriTmi***

dasawyisi



***Z=2,3***





ki ara

X

y=lnx2*+1*  y=sinx





davbeWdoT



dasasrul

***programa***

*#include<iostream.h>*

*#include<math.h>*

*main()*

*{*

*float x , z,y;*

*cout<<”z=”; cin>>z;*

***pasuxi***

z=2,3

Y=

*x=sqrt((z)/(3\*z\*z+1)) ;*

*if(x<=2)*

*y= log(x\*x\*x+1);*

*else*

*y=sin(x);*

*cout<<”y=”<<y<<endl;*

*}*

***laboratoriuli # 5-is davalebebi***

***SeadgineT mocemuli gamosaxulebebis gamoTvlis programa***

|  |  |  |  |
| --- | --- | --- | --- |
| *#* | *gamosaxulebebi* | *sawyisi monacemebi* | |
| *1* |  | C=1,7 A=1,8  B =3,4  X=1.3 D=0,8 | |
| *2* |  | | X=2,3;  B=10 |
| *3* |  | | X=1 |
| *4* |  | | Z=2,17 |
| *5* |  | | X=2,97 |
| *6* | *D=* | | X=1,3; A=37; B=2,6 |
| *7* | *B=* | | X=2,3 |
|  | *A=* | | X=1.01 |
| *9* | *x=sinc\** | | C=81,7 |
| *10* | *X=5tgT* | | T=31 |
| *11* | *X=* | | A=10.;  B=1  T=1,2 |
| *12* | *B=* | | X=2,3  C=1,2 |
| *13* | *B=* | | A=1,2 c=1,81; x=12 |
| *14* | *Y=* | | X=2; A=2,8;  B=-4,2; c=8 |
| *15* | *A=(2+x)\** | | X=2.97 |

***laboratoriuli samuSao #6***

***kvadratuli gantolebis amoxsnis procesis daprogrameba***

*SevadginoT* ***ax2 + bx + c = o*** *kvadratuli gantolebis amoxsnis programa* ***a, b*** *da* ***c*** *koeficientabis nebismieri mniSvnelobebis dros.*

***amoxsna:*** *ganixilebaramdenime SemTxveva:*

*1. Tu* ***a =0, b≠0,*** *maSin* ***x= -c/b*** *;*

*2. Tu* ***a ≠0****, maSin* ***D=b2 – 4 a c****, sadac ganixileba Semdegi SemTxvevebi:*

* *Tu* ***D>o*** *maSin* ***x1,2 = ;***
* *Tu* ***D=o*** *maSin* ***X1=X2 = -b / 2a;***
* *Tu* ***D<o*** *ar arsebobs namdvili tipis fesvebi.*

***algoriTmi***

dasawyisi



***a, b, c***



ara ki

**a =o**

***d= b\*b - 4 \*a\*c; Secvale* a**



ki ara 

d=0 

ara ki

d < 0 

X1=X2= ***-b/( 2 \* a );***



***X1 = (-b - sqrt(d))/(2\*a); amonaxsni ar aqvs***



***X2 = (-b - sqrt(d))/(2\*a);***







davbeWdoT ***X1, X2***





dasasruli

***programa***

***programa:***

***// kvadratuli gantoleba***

***#include<iostream.h>***

***#include<math.h>***

***main()***

***{***

***float a, b, c, d, x, x1, x2 ;***

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

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

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

***if(a==0)***

***{***

***cout<<"Secvale a";***

***goto end; }***

***else***

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

***if(d==0)***

***{***

***x=-b/( 2 \* a );***

***cout<<"x="<<x<<endl;***

***}***

***Else***

***if(d<0)***

***cout<<" amonaxsni ar aqvs " <<endl;***

***else***

***{***

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

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

***cout<<"x1="<<x1<<endl;***

***cout<<"x2="<<x2<<endl;}***

***end:***

***}***

***pasuxi***

***a=***

***b=***

***c=***

***X1=***

***X2=***

***laboratoriuli # 6-is davaleba***

*SevadginoT* ***ax=c*** *wrfivi gantolebis amoxsnis programa* ***a*** *da* ***b*** *koeficientebis nebismieri mniSvnelobebis dros*

***laboratoriuli samuSao #7***

***rTuli ganStoebadi gamoTvliTi procesis daprogrameba***

**amorCevis struqtura if/else (**Tu/ winaaRmdeg SemTxvevaSi**)**

saSualebas gvaZlevs sami SesaZlo alternatiuli variantidana avirCioT erT-erTi.

*mowmdeba piroba1, romelic mosdevs* ***if*** *operators da Tu piroba WeSmaritia sruldeba `brZaneba1~ da ar mowmdeba `piroba2~. Tu mcdaria mowmdeba `piroba2~, Tu piroba WeSmaritia sruldeba `brZaneba2~ Tu mcdaria sruldeba ` brZaneba 3~*

***If/else struqturis sqematuri saxea:***



ki piroba 1 ara piroba 2 ara



brZaneba 1 ki brZaneba 3



brZaneba 2



***If/else struqturis Caweris saxe :***

*If (piroba 1)*

*{*

*brZanebebi -1;*

*}*

*else*

*If (piroba 2)*

*{*

*brZanebebi -2;*

*}*

*else*

*{*

*brZanebebi -3;*

*}*

***SevadginoT mocemuli gamosaxulebis gamoTvlis programa***

Tu a<1

Tu a>1

Tu a=1

*Y= x=1,05*

***algoriTmi***

dasawyisi



***x***





ki ara > 1 ara

ki

y = y= *y=10,5*







davbeWdoT Y

dasasruli

***programa***

*#include<iostream.h>*

*#include<math.h>*

*main()*

*{*

*float x , a,y;*

*cout<<”x=”; cin>>x;*

*a=sqrt(pow((1-cos(x)),3)) ;*

*if(a<1)*

*y= exp (x);*

*else*

*if(a>1)*

*y=sqrt(1+ a\*pow(x,2));*

*else*

*y=10.5;*

*cout<<”y=”<<y<<endl;*

*}*

***pasuxi:***

*x= 1,05*

*y=*

***laboratoriuli # 7-is davalebebi***

*SeadgineT mocemuli gamosaxulebebis gamoTvlis programa*

|  |  |  |
| --- | --- | --- |
| *#* | ***gamosaxulebebi*** | ***sawyisi monacemebi*** |
| *1* |  | c=1,2  X=1.79 |
| *2* |  | X=1,52 |
| *3* | , Z=|AB|, | X=2,7 |
| *5* |  | X=8,17  A=2.06 |
| *4* |  | X=2,97 |
| *6* | *0,1tg ;* | *X=3,18* |
| *7* |  | *X = 12;*  *A = 1,2;*  *C = 1,81* |

|  |  |  |
| --- | --- | --- |
| *#* | ***gamosaxulebebi*** | ***sawyisi monacemebi*** |
| *8* |  | *B = 3,15;*  *Z= 2,66* |
| *9* |  | *X = 2;*  *A = 2,8;*  *B = -4,2;*  *C = 8* |
| *10* |  | *X=2,3*  *C=1,2* |
| *11* | *A=cosx\*sin(*  *;* | *X = 4,3;*  *B = 10;* |
| *12* |  | *X=2,835* |
| *13* |  | *C=81,7* |
| *14* |  | *X=1,01* |
| *15* | *A* | *X=2,3* |

***laboratoriuli samuSao #8***

***mravaljeradi amorCevis struqtura* *switch***

*xSirad algoriTmul ena* ***C****++ -Si gamoiyenaba mravaljeradi amorCevis struqtura* **switch (n)***, romlis Caweris zogadi saxea*

switch(seleqtori)

{

case Wde 1: operatori; break;

case Wde 2: operatori; break;

case Wde 3: operatori; break;

---------------------------

case Wde n: operatori; break;

default: operatori;

}

***seleqtori*** *– gamosaxulebaa, romlis Sedegs warmoadgens mTeli tipis mniSvneloba rogoricaa* **int***,* **long***, an* **char**

*yovel* ***case*** *struqturas gaaCnia Wdeebis**gansazRvruli mniSvneloba da operatorTa CamonaTvali, romelic sruldeba Sewyvetis* ***break*** *operatoramde.* ***break*** *operatoris ar gamoყენebis SemTxvevaSi programaSi operatorebi Sesruldeba momdevno* ***break*** *operatoramde.*

***switch struqturis muSaobis principia:***

1. *gamoiTvleba seleqtoris mniSvneloba da misi mniSvneloba Tanmimdevrulad Sedardeba* **case** *Wdeebis mniSvnelobebs.*
2. *Tu seleqtoris mniSvneloba daemTxveva romelime* **case** *Wdes mniSvnelobas, Sesruldeba is operatorebi, romlebic aRniSnul Wdes mosdevs***break** *operatoramde.*
3. *koduri sityva* **default***gamoiyeneba im SemTxvevaSi, rodesac seleqtoris mniSvneloba ar emTxveva* **case** *Wdeebis arcerT mniSvnelobas.* **default** *Wdis gamoyeneba savaldebulo ar aris, igi SeiZleba Caiweros blokis nebismier adgilas, magram sasurvelia Tu is moTavsdeba blokis bolos.*

***magaliTi 1***

#include <iostream.h>

void main()

{

int n;

cout<<"n="; cin>>n;

switch(n)

{

case 1: cout<<1<<endl; break;

case 2: cout<<2<<endl; break;

case 3: cout<<3<<endl; break;

case 4: cout<<4<<endl; break;

default: cout<<"end"<<endl;

}

cout<<"end switch"<<endl;

}

***magaliTi: SevadginoT programa, romelic n cvladis mniSvnelobis gaTvaliswinebiT gamoTvlis:***

* ***marTkuTxedis farTobs roca n=1***
* ***marTkuTxedis perimeters roca n=2***

dasawyisi



***a,b***



1–marTkuTxedis farTobi

2–marTkuTxedis perimetri



ki ara ara

n=1 n=2

ki

s=a\*b

p=2(a\*b);





davbeWdoT





dasasruli

#include <iostream.h>

pasuxi

a=

b=

s =

void main()

{

int n,a,b,s,p;

cout<<”a=”; cin>>a;

cout<<”b=”; cin>>b;

cout<<"n=1(marTkuTxedis farTobi)”<<endl;

cout<<"n=2(marTkuTxedis perimetri)"<<endl;

cout<<”airchie n: “; cin>>n;

switch(n)

{

pasuxi

a=

b=

p=

case 1: { s=a+b;

cout<<”s=”<<s<<endl;} break;

case 2:

{ p=2\*(a+b);

cout<<”p=”<<p<<endl;} break;

default: cout<<"end switch"<<endl;

}

}

***laboratoriuli # 8-is davaleba:*** *SevadginoT programa, romelic n cvladis mniSvnelobis gaTvaliswinebiT gamoTvlis:*

* *cilindris moculobas roca n=1*
* *konusis moculobas roca n=2*

***laboratoriuli samuSao #9***

***upirobo gadasvlis operatori goto***

***goto*** operatoris Caweras aqvs saxe: ***goto Wde:***

am SemTxvevaSi mocemuli operatoris Sesrulebisas Sesruldeba is operatori, romlis Wdec miTiTebulia goto operatorSi.

***goto*** operatori gamoiyeneba erTmaneTSi Calagebuli iseTi rTuli konstruqciebis SemTxvevaSi, saidanac gamosvla ar aris ioli. Tumca programistTa umravlesoba dRes mas iSviaTad iyenebs.

magaliT:

dasawyisi





***X***



ki X<0 ara

შემოიტანე მხოლოდ დადებითი რიცხვი 



*Y= log(x)*



davbeWdoT Y



dasasruli

***programa***

#include <iostream.h>

#include <math.h>

void main()

{

double x,y;

a: cout <<”x=”; cin>>x;

if(x<=0)

{

cout<<”SeitaneT mxolod dadebiTi ricxvi”<<endl;

goto a;

}

else

{

y=log(x);

cout<<”y=”<<y<<endl;

}

}

***laboratoriuli # 9-is davalebebi***

*SeadgineT mocemuli gamosaxulebebis gamoTvlis programa sawyisi dadebiTi mniSvnelobebis moTxovniT*

|  |  |
| --- | --- |
|  | *Y= ,* |
|  | *y =* |
|  | *y =* |
| ***4.*** |  |
| ***5.*** |  |
|  |  |
| ***8.*** |  |
| ***9.*** |  |
| ***10*** |  |
| ***11*** |  |
| ***12*** |  |
| ***13*** |  |
| ***14*** |  |
| ***15*** |  |

***laboratoriuli samuSao #10***

***cikluri gamoTvliTi procesis daprogrameba***

***gameorebis struqtura while operatori***

***while*** – ciklis Caweris sintaqsi Semdegia:

***while (piroba)***

***{***

***Ooperatorebi***

***}***

sadac ***piroba*** *logikuri gamosaxulebaa, xolo* ***{ }*** *frCxilebSi moTavsebuli* operatorebi ciklis tania.

***while*** *operatori Semdegnairad sruldeba:**ciklis* tani Sesruldeba (ganmeordeba) manm, sanam piroba sruldeba (*logikuri gamosaxuleba “WeSmaritia”(* ***TRUE)****)*, winaaRmdeg SemTxvevaSi – moxdeba ciklidan gamosvla da programa gagrZeldeba ciklis tanis Semdeg Cawerili operatoridan.

***while*** operators struqturulad Semdegi saxea aqvs:





ara

piroba



ki

ciklis tani



***magaliTi:***

*SevadginoT programa, romelic dabeWdavs* y=|x2 –1| *funqciis mniSvnelobaTa cxrils,*  სადაც x ϵ [2;10]; h=0,5

***pasuxi:***

***x y***

***.. ..***

***.. ..***

***programa***

#include <iostream.h>

#include <math.h>

main()

{

int Y=1;

double y, h=0.5,x=2.0;

cout << "x y" << endl;

while (x<=10)

{

y=fabs(x\*x-1);

cout <<x<<” “<<y<<endl;

x+=h;

}

}

***laboratoriuli # 10-is davalebebi***

*dabeWdeT funqciis mniSvnelobebis cxrili* ***while*** *ciklis ope-ratoris gamoyenebiT*

|  |  |
| --- | --- |
| ***1.*** | ***Y=sin x x*** |
| ***2.*** | ***Y=lnx x*** |
| ***3.*** | ***Y=ax+b b=1,5; a=2***  ***x*** |
| ***4.*** | ***Y= a\* sin x a=0,5***  ***x,1*** |
| ***5.*** | ***Y=a a=2***  ***x*** |
| ***6.*** | ***Y=***  ***x*** |
| ***7.*** | ***Y= x*** |
| ***8.*** | ***Y=ab x a=1,5; b=2,5***  ***x*** |
| ***9.*** | ***Y=cos x***  ***x*** |
| ***10*** | ***Y=***  ***x*** |
| ***11*** | ***Y=arctgx***  ***x*** |
| ***12.*** | ***Y=***  ***x*** |
| ***13.*** | ***Y=***  ***x*** |
| ***14.*** | ***Y=***  ***x*** |
| ***15.*** | ***Y=xln x***  ***x*** |

***laboratoriuli samuSao #11***

***cikluri gamoTvliTi procesis daprogrameba***

***gameorebis struqtura do/while operatoriT***

***do….while*** warmoadgens ***while*** ciklis saxeSecvlil variants, sadac ciklis gagrZelebis piroba mowmdeba ciklis bolos. e.i. miuxedavad ciklis pirobis mcdarobisa ciklis tanSi arsebuli operatorebi Tavidan erTxel mainc Sesruldeba.

***do….while*** -is saxea:

***do***

***{***

***operatorebi***

***}***

***while (piroba);***



ciklis tani

ciklis tani

ciklis tani



ki piroba ara



***magaliTi***

SevadginoT programa xuTelementiani masivis x[5]={3,5,4,1,2}, maqsimaluri elementis da misi rigiTi nomris mosaZebnad.

***nimuSi:***

#include <iostream.h>

void main ()

{

int x[5]={3,5,4,1,2},i=0,n=0,max;

max=x[0];

do

{

if (max < x[i+1])

{ max=x[i+1]; n=i+1;}

i=i+1;

}

while(i<=3);

cout<<"maximaluri elementi: ” <<max;

cout<<” rigiti nomeri: ”<<n;

}

***laboratoriuli #11-is davalebebi***

|  |  |
| --- | --- |
| *1* | *Y={17,8,21,5,20} masivis maqsimaluri elementi da misi rigiTi nomeri* |
| *2* | *X={5,8,12,20,11,4} masivis minimaluri elementi da misi rigiTi nomeri* |
| *3* | *Yi ={10,12,25,15,8,2} masivis maqsimaluri elementi da misi rigiTi nomeri* |
| *4* | *Y={12,22,18,19,10} masivis minimaluri elementi* |
| *5* | *Y={12,17,11,15,19,21,46} masivis minimaluri elementi da misi rigiTi nomeri* |
| *6* | *Y={14,18,22,5,20} masivis minimaluri elementi da misi rigiTi nomeri* |
| *7* | *Y={19,18,1,15,30,42,50} masivis maqsimaluri elementi* |
| *8* | *Y={17,8,21,5,20} masivis minimaluri elementi* |
| *9* | *Y={7,28,31,15,20} masivis maqsimaluri elementi da misi rigiTi nomeri* |
| *10* | *Y={27,18,11,15,30} masivis minimaluri elementi da misi rigiTi nomeri* |
| *11* | *Y={11,8,25,12,20} masivis maqsimaluri elementi* |
| *12* | *Y1{10,8,22,7,29} masivis minimaluri elementi* |
| *13* | *Y={7,8,29,9,10,38} masivis maqsimaluri elementi da misi rigiTi nomeri* |
| *14* | *Y={14,9,22,5,30} masivis minimaluri elementi da misi rigiTi nomeri* |
| *15* | *Y={17,18,21,25,29} masivis maqsimaluri elementi* |

***laboratoriuli samuSao #12***

***martivi cikluri procesis daprogrameba***

gameorebis struqtura for cikli moicavs yvela im elements, romelic saWiroa ama Tu im moqmedebis mravaljer Sesasruleblad da imarTeba erTgvari mTvleliT. igi warmoadgens ciklis im saxes, sadac gameorebaTa ricxvi winaswar aris gansazRvruli.

***for*** ciklis Caweris sintaqsi Semdegia:

***for*** (inicializacia; piroba; inkrementi)

{

ciklis tani

}

sadac inicializacia - ciklis mmarTveli cvladisaTvis sawyisi mniSnelobis miniWebaa,

piroba - ciklis ganmeorebis pirobaa. ciklis tani meordeba manam, sanam piroba sruldeba.

***magaliTi***

SevadginoT programa , romelic gamoTvlis x[5]={3,5,4,1,2} masivis elementebis jams.

***nimuSi:***

#include <iostream.h>

void main ()

{

int x[5]={3,5,4,1,2}, s=0;

for(int i=0; i<=4; i++)

{

s=s+x[i];

}

cout<<”s=”<<s;

}

***laboratoriuli #12-is davalebebi***

|  |  |
| --- | --- |
| *1* | *x1=* |
| *2* | *. x1=* |
| *3* | *. x1=* |
| *4* | *x1=* |
| *5* | *x1 = { 3, 8, 12, 15, 20}* |
| *6* | *x1=* |
| *7* | *x1=* |
| *8* | *x1=* |
| *9* | *x1=}* |
| *10* | *x1=* |
| *11* | *x1=* |
| *12* | *x1=* |
| *13* | *x1=* |
| *14* | *x1=* |
| *15* | *x1=* |

***laboratoriuli samuSao #13***

**cikli ganStoebiT**

***magaliTi :*** *xuTelementiani masivis*

x[5]={3,5,4,1,2}, elementebi

davalagoT zrdadobiT

***magaliTi :***

// masivis elementebis zrdadobiT dalageba

#include <iostream.h>

#include <math.h>

void main ()

{

int x[5]={3,5,4,1,2}, buf;

cout << "macivi: 3 5 4 1 2" <<endl;

cout << "dalagebuli zrdadobit: " <<endl;

for(int n=0; n<=3; n++)

{

for(int i=0; i<=3; i++)

{ if (x[i ] > x[i+1])

{ buf=x[i]; x[i]=x[i+1]; x[i+1]=buf; }

}

}

for(int i=0; i<=4; i++)

{ cout <<x[i] << " "; }

}

***laboratoriuli #13-is davalebebi***

|  |  |
| --- | --- |
|  | *mocemulia masivi Xi (i=1,2, … 10), gansazRvreT masivis minimaluri wevris indeqsis mniSvneloba* |
|  | *. mocemulia masivi Ai (i=1,2, … 15), gansazRvreT arauaryofiTi wevrebis namravli* |
|  | *mocemulia masivi Ai (i=1,2, … 15), gansazRvreT arauaryofiTi wevrebis wevrebis jami.* |
|  | *mocemulia masivi Ai (i=1,2, … 10), ipoveT 0-is toil wevrebis raodenoba.* |
|  | *mocemulia masivi Ai (i=1,2, … 15), gansazRvreT uaryofiTi wevrebis indeqsis mniSvnelobebi.* |
|  | *mocemulia masivi Ai (i=1,2, … 15), gansazRvreT arauaryofiTi wevrebis indeqsis mniSvnelobebi.* |
|  | *mocemulia masivi Ai (i=1,2, … 20), masivis maqsimaluri wevri SecvaleT igi 0-iT.* |
|  | *mocemulia masivi Xi (i=1,2, … 25), gansazRvreT masivis arauaryofiTi wevrebis indeqsis mniSvnelobebi.* |
|  | *mocemulia masivi Xi (i=1,2, … 25), gansazRvreT masivis*  *uaryofiTi wevrebis indeqsis mniSvnelobebi.* |
|  | *mocemulia masivi Xi (i=1,2, … 20), dabeWdeT 0-is toli wevrebis indeqsis mniSvnelobebi.* |
|  | *mocemulia masivi Xi (i=1,2, … 10), gamoTvaleT masivis dadebiT wevrebs Soris maqsimaluri* |
|  | *mocemulia masivi Xi (i=1,2, … 15), gansazRvreT masivis minimaluri wevri* |
|  | *mocemulia masivi Ai (i=1,2, … 10), gansazRvreT arauaryofiTi wevrebis namravli* |
|  | *mocemulia masivi Ai (i=1,2, … 10), ipoveT 0-isagan gansxvavebuli wevrebis jami* |
|  | *mocemulia masivi Ai (i=1,2, … 15), gansazRvreT uaryofiTi wevrebis raodeba* |

***laboratoriuli samuSao #14***

***rTuli cikluri gamoTvliTi procesis daprogrameba***

*mocemulia masivi Ai j (i=10,20,30); ( j=40,50,60)*

*vipovoT masivis elementebis jami*

***// organzomilebiani masivis elementebis***

***jamis gamoTvla***

***programa:***

#include <iostream.h>

#include <math.h>

void main()

{

int i=0,j=0;

float s=0, x[2][3]={{10,20,30},{40,50,60}};

while (i<=1)

{

j=0;

while(j<=2)

{

s=s+x[i][j];

j++;

}

i++;

}

cout << "s=" << s << endl;

}

***laboratoriuli # 14-is davalebebi***

|  |  |
| --- | --- |
| *1* | *mocemulia masivi Xi (i=1,2, … 15), gansazRvreT masivis minimaluri wevri da misi Sesabamisi indeqsis mniSvneloba* |
| *2* | *ipoveT min {e sinx}, Xϵ[0,5;1], h=0,05 da dabeWdeT misi Sesabamisi argumentis mniSvneloba.* |
| *3* | *mocemulia masivi Ai (i=1,2, … 10), gansazRvreT arauaryofiTi wevrebis namravli da uaryofiTi wevrebis jami.* |
| *4* | *mocemulia masivi Ai (i=1,2, … 10), ipoveT 0-isagan gansxvavebuli wevrebis jami da 0-is toil wevrebis raodenoba.* |
| *5* | *ipoveT max {}, Xϵ[1; 5,5], h=0,5 da dabeWdeT misi Sesabamisi argumentis mniSvneloba.* |
| *6* | *mocemulia masivi Ai (i=1,2, … 15), gansazRvreT uaryofiTi wevrebis raodeba da dabeWdeT arauaryofiTi wevrebis indeqsis mniSvnelobebi.* |
| *7* | *mocemulia masivi Ai (i=1,2, … 20), uaryofiTi wevrebi SecvaleT 0-ebiT. dabeWdeT axali masivi* |
| *8* | *mocemulia funqcia y =gansazRvreT funqciis dadebiT mniSvnelobaTa jami da uaryofiT mniSvnelobaTa namravli.* |
| *9* | *mocemulia funqcia y=gansazRvreT funqciis dadebiT mniSvnelobaTa Soris maqsimaluri* |
| *10* | *mocemulia masivi Ai (i=1,2, … 20), ipoveT masivis maqsimaluri wevri, SecvaleT igi 0-iT. dabeWdeT axali masivi* |
| *11* | *mocemulia funqcia y=SeadgineT funqciis uaryofiTi mniSvnelobebis cxrili.* |
| *12* | *mocemulia masivi Xi (i=1,2, … 25), gansazRvreT masivis arauaryofiTi wevrebis raodenoba da dabeWdeT uaryofiTi wevrebis indeqsis mniSvnelobebi.* |
| *13* | *mocemulia masivi Xi (i=1,2, … 20), gamoTvaleT masivis 0-sagan gansxvavebuli wevrebis namravli da dabeWdeT 0-is toli wevrebis indeqsis mniSvnelobebi.* |
| *14* | *mocemulia funqcia y=gamoTvaleT funqciis im mniSvnelobaTa jami romalTa absolituri sidide 0,5-ze metia mniSvnelobaTa namravli.* |
| *15* | *mocemulia masivi Xi (i=1,2, … 10), gamoTvaleT masivis dadebiT wevrebs Soris minimaluri* |

***laboratoriuli samuSao #15***

**cikli ganStoebiT**

***magaliTi*** : SevadginoT programa mocemuli xuTelementiani x[5]={3,5,4,1,2}, masivis minimaluri wevrisa da misi Sesabamisi indeqsis mniSvnelobis gansazRvrisaTvis.

***programa:***

#include <iostream.h>

void main ()

{

int x[5]={3,5,4,1,2}, i=0, min,n;

min=x[0]; n=i;

while(i<=3)

{ if (min > x[i+1])

{min=x[i+1]; n=i+1;}

i++;

}

cout << "macivi: 3 5 4 1 2" <<endl;

cout << "minimaluri elementi: "<<min << endl;

cout << "rigiti nomeri: "<< n << endl;

}

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