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22.18

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PASCAL . -  
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Pascal.

:

;

!

Turbo Pascal

Borland

*F10.*

Turbo Pascal

turbo.exe (  
*F2*),

)

( )

*F10* ( );

**FILE**

*Enter;*

**NEW** ( );

;

**F10**

*File;*

**Save As;**

*Enter* ( );

**F10**

**Turbo Pascal**

**Run ,**

*Ctrl+F9;*

*Alt+F5.*

) ( )

:

;

*File,*

*Save*

**F10,**

**F2;**

,

)

*Save As.*

**File**

*Save (F2).*

*File*

)

**F10**

*File;*

*Open (F3)*

;

**Turbo Pascal**

)

,

Ctrl+K-B ( Ctrl+K,

);

( ) Ctrl+K-K;

Ctrl+K-P.

:

Uses printer;

lst;

(Ctrl+F9).

)

Turbo Pascal 7.0 , . . .

- Alt+F3 . F6.

F10

Windows.

Turbo Pascal

,

:

- Shift ( , );

- Ctrl+Ins

Shift+Del, ;

- Shift+Ins;

- Ctrl+Del.

F10, Edit, :

:

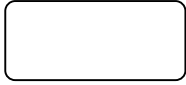


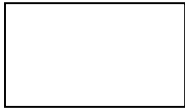

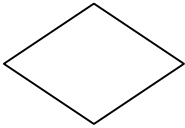
,

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
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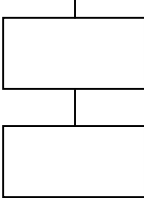
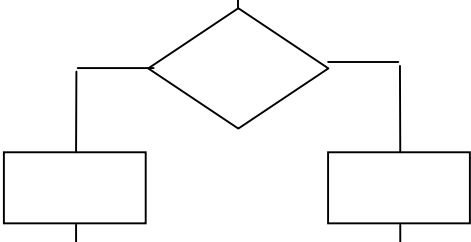
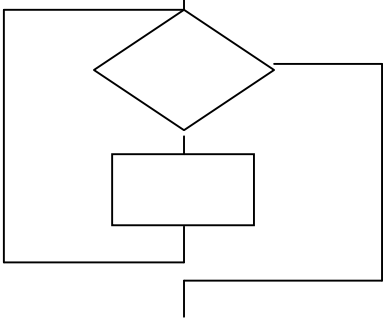
		-
		
		

3

- .

2-

-

	
( )	
	



	<pre>graph TD; A[ ] --&gt; B[ ]; A --&gt; C[ ]; A --&gt; D[ ]; B --&gt; E[ ]; C --&gt; E[ ]; D --&gt; E[ ]; E --&gt; F[ ]</pre>
	<pre>graph TD; A[ ] --&gt; B{ }; B --&gt; C[ ]; C --&gt; B</pre>
	<pre>graph TD; A[ ] --&gt; B{ }; B --&gt; C[ ]; C --&gt; B</pre>
	<pre>graph TD; A[ ] --&gt; B{ }; B --&gt; C[ ]; C --&gt; B</pre>

2.1

:  
 ) 26 ( , );  
 ) 0 9;  
 ) : (.), (;), (:),  
 (,), (');  
 ) : (+), (-), (\*),  
 (/);  
 ) : (>), (<), (=);  
 ) : ( ), { }, [ ];  
 ) .

Pascal

2.2

2.2.1

- , ,  
 - , ,  
 ( , ) -  
 .  
 Pascal .  
 :  
 ( .3): , ,

	<b>INTEGER</b>	32768 32767
( )	<b>REAL</b>	$10^{38}$ $10^{-38}$
	<b>BOOLEAN</b>	TRUE ( ) FALSE ( )
( )	<b>CHAR</b>	.
		,
		,

Pascal, ( )  
 ) , .  
 ,  
 INTEGER, REAL, CHAR, BOOLEAN STRING.

**2.2.2**

- : , -  
 , , . ( )  
 ( : NAME name -

63 .

**2.2.3**

.  
**CONST** < : > = ;  
 ( 40 )  
 : CONST PT=31.592; TT='S'; A=7;

( 10 ).

:

"+"

.4.

4 -

	<i>Pascal</i>
2,87	2.87
-0,315	-0.315    -.315
184	184    +184
210000	2.1E+5, 2.1E5, 21E4 ...
-0,00045	-0.00045, -.00045, -45E-5, -.45E-3
-1000	-1E+3, -1E3, -E3

Pascal

:

PI=3.14159265... ; MAXINT -

,

32767.

### 2.2.4

VAR,

:

VAR < >, ... , < > :: < >;

:

VAR TOP : INTEGER;

X, Y : REAL;

A : ARRAY[1..10] OF INTEGER;

B : ARRAY[1..5,1..7] OF REAL;

### 2.3

Pascal ( .5)

( .6).

5 -

		Pascal
	$\sin(x)$	<b>SIN ( X )</b>
	$\cos(x)$	<b>COS ( X )</b>
	$\arctan(x)$	<b>ARCTAN ( X )</b>
	$ x $	<b>ABS ( X )</b>
	$\sqrt{X}$	<b>SQRT ( X )</b>
	$e^x$	<b>EXP ( X )</b>
	$\ln(x)$	<b>LN ( X )</b>
	$x^2$	<b>SQR ( X )</b>
	$\text{sign}(x)$	<b>SGN ( X )</b>
$\pi$	$\pi$	<b>PI</b>

x

$$x^a = e^{a \ln(x)}$$

Pascal : **EXP ( A \* LN ( X ) )**.

6 -

<b>TRUNC ( X )</b>	

6

--	--

<b>ROUND (X)</b>	
<b>ORD (X)</b>	-
<b>CHR (X)</b>	-
<b>SUCC (X)</b>	-
<b>PRED (X)</b>	

**ORD(X) , SUCC(X) PRED(X)**

## 2.4

### 2.4.1

. , , -  
 ,  
 : "+" ( ), "-" ( ), "\*" ( -  
 ), "/" ( ), DIV ( ), MOD ( ).  
 :  
 ) ;  
 ) ( \* , / , DIV , MOD , AND, NOT );  
 ) ( + , - , OR ).  
 . + , - , \* INTEGER , -  
 INTEGER, REAL -  
 / REAL,  
 MOD, DIV INTEGER,  
 INTEGER.

:

)  $\sqrt{1 + \text{LN}(1,3X) + \text{COS}(A - T)}$ ; )  $2^x \text{COS}(BX) - 3^x \text{SIN}(BX)$ .

**Pascal:**

) `SQRT ( 1+LN ( 1.3 * X ) + COS ( A - T ) )`;

) `EXP( X * LN ( 2 ) ) * COS ( B * X ) - EXP( X * LN ( 3 ) ) * SIN ( B * X )`.

**2.4.2**

), "<>" ( ), "<" ( ), ">" ( ), "<=" ( ),  
">=" ( ).

( ), OR - ( ) : NOT - , AND - -

: A = B;

( A > 0 ) AND ( B > 0 ).

**2.5**

Pascal

( ; )  
**BEGIN END.**

**PROGRAM** < > ;

**USES CRT;**

**LABEL**

< >, ... , < >;

**CONST**

< > = < >;

```

      :
      <           > = <           >;
TYPE
      <           > = <           >;
      :
      <           > = <           >;
VAR
      <           >, ..., <           > : <           >;
      :
      <           >, ..., <           > : <           >;
PROCEDURE <           >;
      <           >;
FUNCTION <           >;
      <           >;
BEGIN
      <           >;
      :
      <           >
END.

```

```

      :
PROGRAM - .
LABEL - . - , -
      , . , -
      .
CONST - .
TYPE - . -
      , .
VAR - .
PROCEDURE, FUNCTION - . -
      , -

```



Pascal

## 2.6

### 2.6.1

### 2.6.2

BEGIN END.

. BEGIN -  
END

3



```

    b1,b2, ... , bn - , . ( -
,
WRITE(b1,...,bn); ,
,
WRITELN(b1,b2, ... ,bn); -
.
WRITELN; -
.
, , .
:
WRITE(b : m);
WRITELN(b : m); ,
:
WRITE(b : m : n);
WRITELN(b : m : n); ,
b - ; m - , ; n -
, .

```

### 3.2

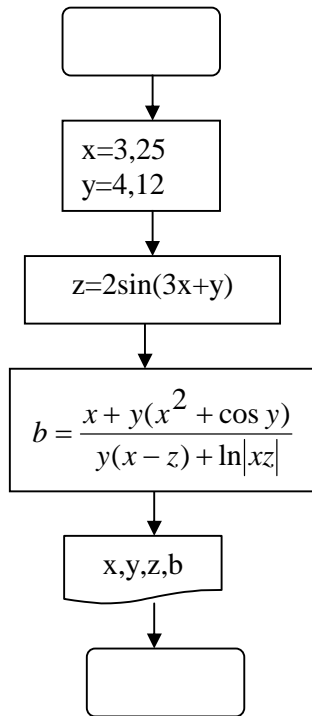
$$: b = \frac{x + y(x^2 + \cos y)}{y(x - z) + \ln|xz|},$$

z=2sin(3x+y); x=3,25; y=4,12.

```

program P_1;
uses crt;
  const x=3.25;y=4.12;
  var z,b:real;
begin
  z:=2*sin(3*x+y);
  b:=(x+y*(sqr(x)+cos(y)))/(y*(x-z)+ln(abs(x*z)));
  writeln('      x=',x:4:2,' y=',y:5:2,' z=',z:5:2,'
b=',b:5:2);
end.

```



4

### 4.1

( ) . :

**GOTO n; ,**  
**n -** .

:

**IF < > THEN**  
 < 1 >  
**ELSE**  
 < 2 >;

```

IF.
    IF < > THEN < >;
        THEN-
        IF.
        BEGIN END.

```

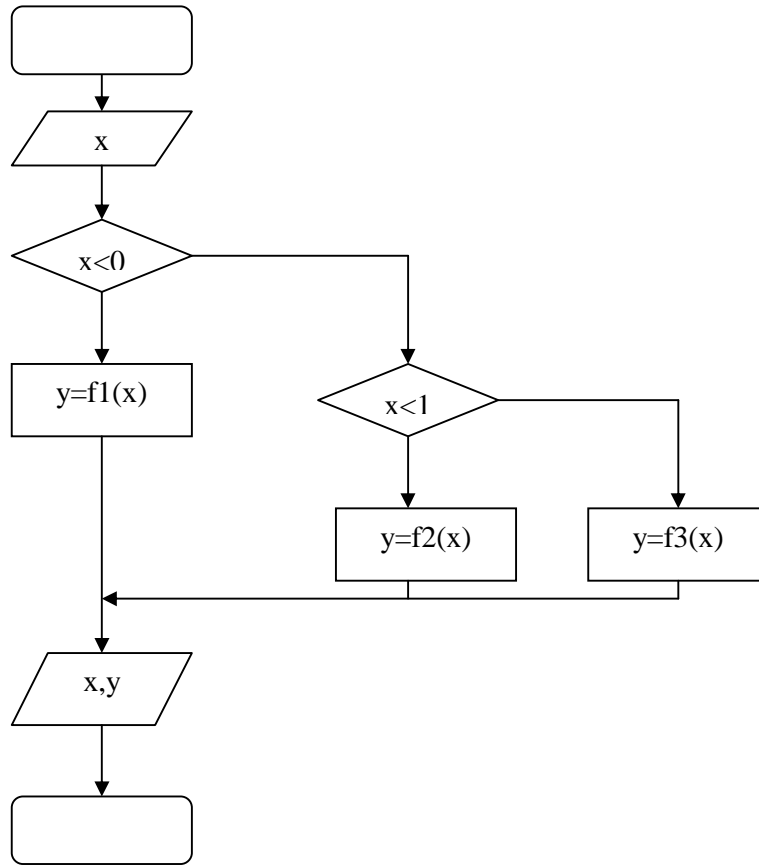
## 4.2

$$Y = \begin{cases} \frac{(2x+1)}{x^5} & x < 0, \\ e^{x+1} + \cos(x), & 0 \leq x \leq 1, \\ 3 \ln \sqrt[5]{\sin(x)} + x^2, & x > 1. \end{cases}$$

```

program _2;
uses crt;
var x, y, m : real;
begin
  clrscr;
  writeln(' x ');readln(x);
  clrscr;
  if x<0 then y:=(2*x+1)/(x*x*x*x*x)
  else
    if x=0 then y:=exp(x+1)+cos(x)
    else
      begin
        m:=sin(x)+sqr(x);
        y:=3*ln(exp(ln(m)/5))
      end;
  writeln(' x= ',x:6:3,' y= ',y:12:5);
  r:=readkey
end.

```



5

5.1

5.1.1 WHILE (" ")

WHILE...DO

WHILE < > DO  
 < >;

begin end, ..

( < , > ).

### 5.1.2 REPEAT

REPEAT

< I >;

...

< n >;

UNTIL < >;

### 5.1.3

:

FOR i := m1 TO m2 DO < >;

FOR i := m1 TO m2 DOWTO < >;

i -

m1 -

m2 -

DO -

DOWTO -

>;

>;

;

;

;

+1;

-1.

### 5.2

$$y = \sum \frac{\ln^3 x - 4}{\sin(x)^2}, \quad 0,9 \quad 3,9, \quad h=1:$$

) WHILE;

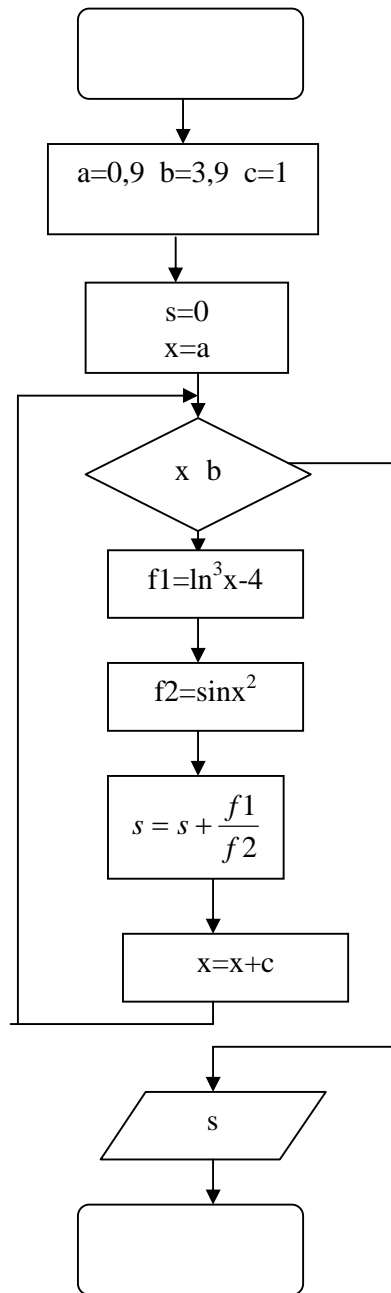
) REPEAT.

) program p\_3a;

```

uses crt;
  const a=0.9;b=3.9;c=1;
  var x,s,f1,f2:real;
begin
  x:=a; s:=0;
  while x<=b do
    begin
      f1:=sqr(ln(x))*ln(x)-4;
      f2:=sin(sqr(x));
      s:=s+f1/f2;
      x:=x+c;
    end;
  writeln('Y=',y:7:3);
end.

```

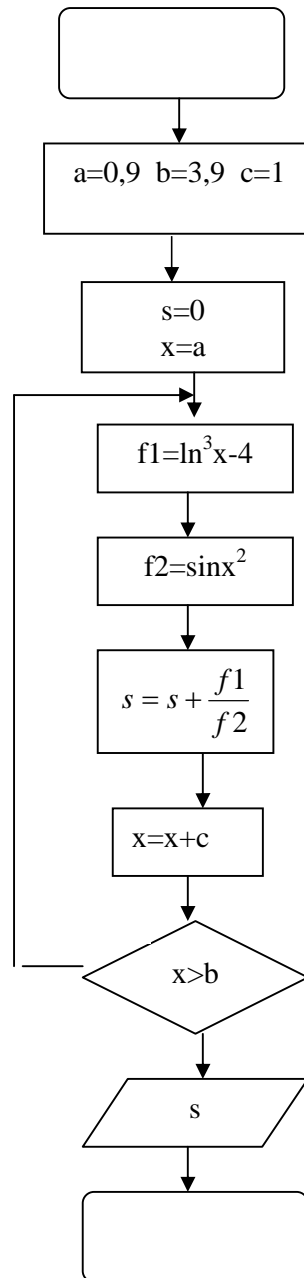




```

) program P_3b;
  uses crt;
  const a=0.9;b=3.9;c=1;
  var x,s,f1,f2:real;
begin
  x:=a; s:=0;
  repeat
    f1:=sqr(ln(x))*ln(x)-4;
    f2:=sin(sqr(x));
    s:=s+f1/f2;
    x:=x+c;
  until x>b;
writeln('Y=',y:7:3);
end.

```



## 6

### 6.1

$$n = \left[ \frac{x_k - x_n}{h} \right] + 1,$$

$x_k, x_n$  ;  
 $h$  ;  
"[ ]"

, **n**

### 6.2

$$y = \begin{cases} \ln^3 \sqrt{|x|}, & \leq 0,7, \\ \cos^2 |x|, & > 0,7. \end{cases}$$

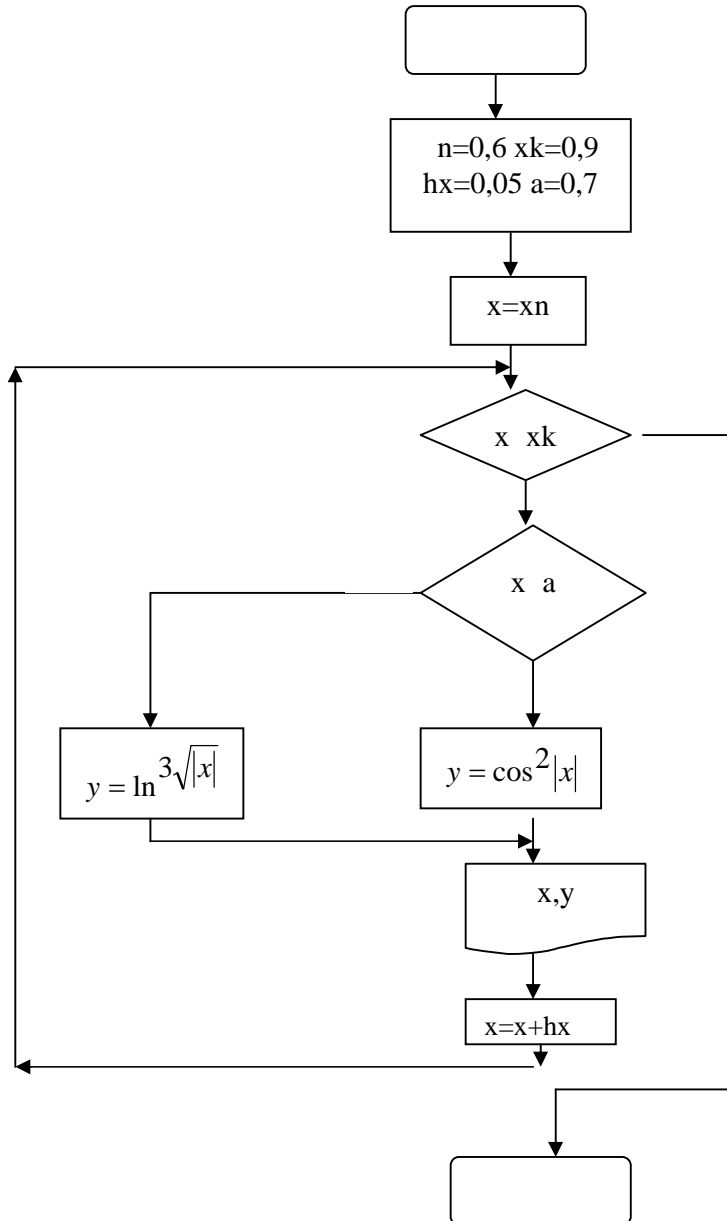
0,6 0,9 0,05.

```
program p_4;
use crt;
var xn,xk,hx,a,x,y:real;
begin
  xn:=0.6; xk:=0.9; hx:=0.05; a:=0.7;
  writeln('          X,Y');
  writeln('-----');
  writeln('!      X      !      Y      !');
  writeln('-----');
  x:=xn;
  while x<=xk do
    begin
      if x<=a then
        y:=sqr(ln(sqr(abs(x))))*ln(sqr(abs(x)))
```

```

else
    y:=sqr(cos(abs(x)));
writeln('!',x:9:2,' !',y:9:4,' !');
x:=x+hx;
end;
writeln('-----');
end.

```





### 7.1.3

```

CASE < > OF
  < 1 > : < 1 >;
  < 2 > : < 2 >;
  ⋮
  < n > : < n >;
[ ELSE
  < > ]
END; ,
< > - , ;
< > - , ;
< > - <
>
, < > ELSE . ELSE

```

CASE.

### 7.2

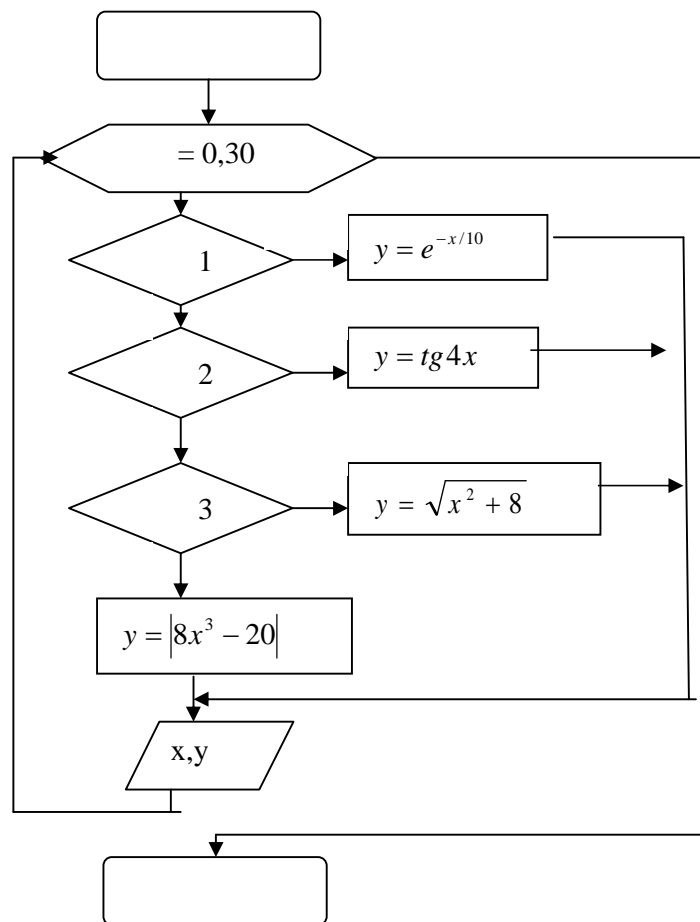
$$y = \begin{cases} e^{-x/10} , & x \in X1, \\ \operatorname{tg} 4x , & \in X2, \\ \sqrt{x^2 + 8} , & x \in X3, \\ |8x^3 - 20| , & \in X4. \end{cases}$$

1 - [10,20], 2 - [10,20], 3 - [1,8], 4 - [10,20], 0 30.

```

program p_5;
uses crt;
  type arg=0..30;
  var x:arg;y:real;
BEGIN
  ClrScr;
  for x:=0 to 30 do
    begin
      case x of
        10,12,14,16,18,20: y:=exp(-x/10);
        11,13,15,17,19: y:=sin(4*x)/cos(4*x);
        1,2,3,4,5,6,7,8: y:=sqrt(sqr(x)+8);
        else y:=abs(8*sqr(x)*x-20);
      end;
      writeln('      x=',x:3,' y=',y:5:2);
    end;
  end.

```



## 8.1

**TYPE T = ARRAY [T1,T2, ..., Tk] OF TC;**

**T -** ;

**T1, ..., Tk -** ;

**TC -** / .

, REAL INTEGER. <sup>k -</sup> .

**VAR M: T; ,**

M - .

:

**VAR M: ARRAY [T1, T2, ... Tn] of TC.**

( 1, 2, ... , 8)

: M[1], M[2], ... , M[8].

**k** , ,  
 k - . k = 1 ,  
 k = 2 - . ( ,  
 , ), ( ,  
 ).

	A[i] mod 2 = 0 ;
	A[i] mod 2 <> 0 ;
k	A[i] mod k = 0 ;
k	A[i] mod k <> 0 ;
	i mod 2 = 0 ;
	i mod 2 <> 0 ;
	A[i] > 0 ;
	A[i] < 0 ;
(x1,x2)	(A[i]>x1) and (A[i]<x2).

## 8.2

(12),

```

program p_6;
uses crt;
type mas=array[1..12] of integer;
var b:mas;i,k,s:integer;sa:real;
BEGIN
  clrscr;
  writeln('          12          B: ');
  for i:=1 to 12 do read(b[i]);
  writeln('          B: ');
  for i:=1 to 12 do write(b[i]:4);
  writeln;
  s:=0;
  k:=0;
  for i:=1 to 12 do
  if (b[i]<0) and (i mod 2=0) then
  begin
    s:=s+b[i];
    k:=k+1;
  end;
  writeln('
s=',s:6);
  writeln('          k=',k:4);

```



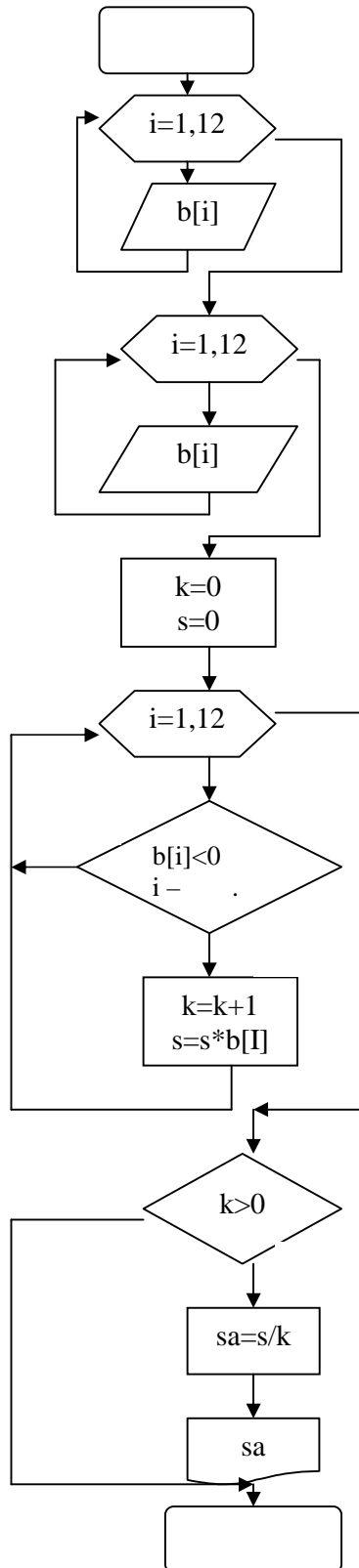
```

if k>0 then
begin
  sa:=s/k;
  write('
end
else write('
end.

```

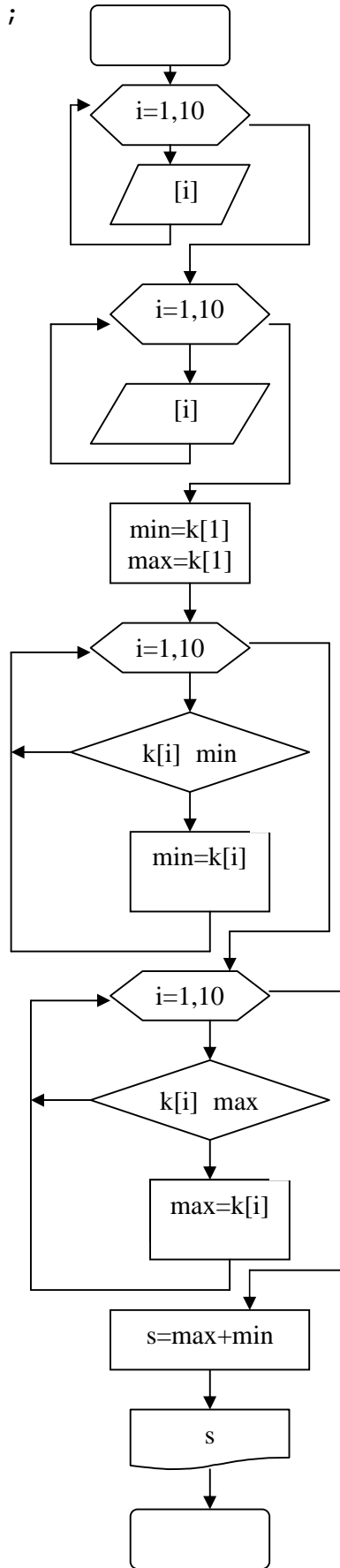
```
sa=' ,sa:5:2);
```

```
');
```





```
writeln('      =',s:4);  
end.
```



## 10.1

Pascal

TYPE

```
STROKA = ARRAY [1..3] OF REAL;
MATR = ARRAY [1..2] OF STROKA;
```

VAR

```
V : STROKA;
A : MATR;
```

TYPE

```
MATR = ARRAY [1..2] OF ARRAY [1..3] OF REAL;
```

VAR

```
A : MATR;
```

TYPE

```
MATR = ARRAY [1..2,1..3] OF REAL;
```

VAR

```
A : MATR;
```

```

VAR
    A : ARRAY [1..2,1..3] OF REAL;
    I -      J -
    A[I,J].
    :
k-          - A[k,j] j=1, ..., m,
k-          - A[i,k] i=1, ..., n.
(m=n)      :
            - A[i,i]    i=1, ..., n,
            - A[i,n+1-i] i=1, ..., n,
            - A[i,j]    i>j,
            - A[i,j]    i<j.

```

## 10.2

3

```

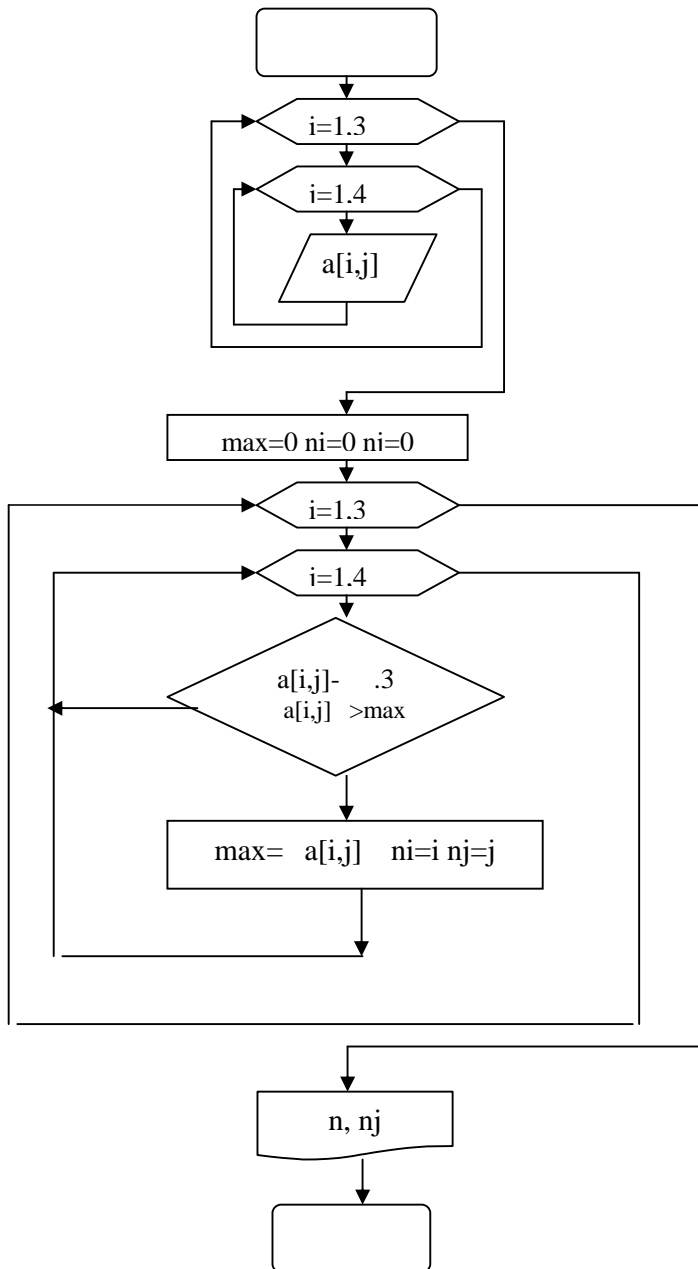
program p_8;
uses crt;
const n=3;m=4;
type matr=array[1..n,1..m]of integer;
var i,j,indi,indj,max:integer;
a:matr;
begin
writeln('          ',n,' x ',m);
for i:=1 to n do
begin writeln;
for j:=1 to m do read(a[i,j]);
end;
writeln('          :');
for i:=1 to n do
begin writeln;
for j:=1 to m do write( ' ',a[i,j])
end;
max:=0;ni:=0;nj:=0;
for i:=1 to n do
for j:=1 to m do
if (a[i,j] mod 3 =0) and (abs(a[i,j])>max) then
begin

```

```

        max:=abs(a[i,j]);ni:=i;nj:=j
    end;
    writeln;
    writeln('
    writeln('ni,'-
end.
        ',nj,' -
        ');
        ');

```



- 1 : . . . , . . . -  
.- .: . , 1990. - 223 .
- 2 . . . .- .: . , 1991.- 160 . -
- 3 . -  
.- .: , 1991. - 320 . -
- 4 : -  
, 1991. - 324 . -
- 5 . . . , . . . , . . . -  
.- .: , 1988. - 320 . -
- 6 . . . , . . . .-  
. : , 1988. - 128 . -
- 7 . . . , . . . -  
.- .: , 1987. - 112 . -
- 8 . . . .- .: -  
, 1989. - 128 . -
- 9 . . . , . . . .- : . , 1989. - 223 . -
- 10 . . . i  
TURBO-PASCAL. - i : i , 1995. - 352 c. -

