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"БЕЛГОРОДСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНОЛОГИЧЕСКИЙ
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Кафедра информационных технологий

Утверждено
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университета

ОСНОВЫ VISUAL BASIC FOR APPLICATIONS

Методические указания к выполнению практических заданий по дисциплине
"Информационные технологии"

Белгород 2017

УДК 004.434
ББК 32.973
О 75

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О 75

Основы Visual Basic for Applications:
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Методические указания предназначены для приобретения студентами базовых навыков по работе в среде программирования Visual Basic for Applications и содержат теоретический материал и задания к выполнению пяти лабораторных работ.

УДК 004.434
ББК 32.973

Belgorod State Technological University named after V.G. Shukhov

IT Department

Stremnev A.Y.

BASICS OF VISUAL BASIC FOR APPLICATIONS

The methodical recommendations

for the practical course "Information technologies"

2017

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LABORATORY WORK № 1.
ESSENTIALS OF VISUAL BASIC

Summary

Visual Basic (VB) (Visual Basic for Applications (VBA)) environment. Writing and launching programs. Debugging.

Task

1. Run MS Excel.
2. ***Ribbon*** > ***RIGHT CLICK*** > ***Настройка ленты*** (***Adjusting***).
3. Select ***Основные вкладки*** (***Main Tabs***) > ***Разработчик*** (***Developer***). Press ***OK***.
4. ***Ribbon*** > ***Разработчик*** (***Developer***) > ***Visual Basic***.
5. ***Insert*** > ***Module*** (find **Module1** in ***Project Explorer***, find **Module1** in ***Work space*** and in ***Title*** of VBA window).
6. ***Insert*** > ***Module*** (find **Module2** in ***Project Explorer***, find **Module2** in ***Work space***).
7. ***DOUBLE CLICK*** on Module1 in ***Project Explorer*** (find changes in the ***Title*** of VBA window).
8. ***RIGHT CLICK*** on **Module2** in ***Project Explorer*** > ***Remove*** **Module2** > ***…Export...?*** > ***Нет*** (***No***).
9. ***Title*** of ***Project Explorer*** > ***Закрыть*** (***Close***).
10. ***View*** > ***Project Explorer***.
11. Find that ***Title*** of VBA window has name **Module1** and then write following program code in ***Work space***.

```
Sub program_1()
Dim n As Double
Dim s As Variant
```

```
n=1
n=n+3
s=Inputbox("Input any number")
n=(n+s)/2
Msgbox ("Average value = " & n)
End Sub
```

12. ***File*** > ***Save*** **Книга1** (**WorkBook1**) > ***Select location*** (**D:/Student/…**) > Type any ***Имя файла*** (***File Name***) > Set ***Тип файла*** (***File type***) as ***"Книга Excel с поддержкой макросов xlsm"*** (***Excel WorkBook with including of macros***). Press ***OK***.

13. Close VBA window.

14. ***Ribbon*** > ***Разработчик*** (***Developer***) > ***Код*** (***Code***) > ***Безопасность макросов*** (***Macros safety***). Select variant ***Отключить все макросы с уведомлением*** (***Blocking macros with notification***). Press ***OK***.

15. Close MS Excel.

16. Find and open your last created Excel file.

17. Press ***Включить содержимое*** (***Macros enabled***) in alert notification.

18. ***Ribbon*** > ***Разработчик*** (***Developer***) > ***Visual Basic***.

19. ***DOUBLE CLICK*** on **Module1** in ***Project Explorer*** to open it in work space (if it has not happened automatically).

20. Put cursor in any place of program and choose ***Run*** button on toolbar (or ***Run*** > ***Run Sub*** (***F5***)).

21. Write **5** in open dialog – this is your program. Press ***OK***.

22. See the next window – with result message ("**Average value = 4,5**"). Press ***OK***.

23. Put cursor in any place of program and run step by step launch – ***Debug*** > ***Step Into*** (***F8***).

24. Follow the active row of program code and do next steps (***F8***). During this process put mouse pointer above the variables (n, s) in code to see the tooltips with current values.

25. Do ***F8*** to the end of program. Last line (**End Sub**) will become white-color after yellow.

26. Put cursor behind the n-variable in code and use ***RIGHT CLICK*** > ***Add Watch***.

27. Control the text **n** in ***Add Watch*** dialog. Press ***OK***.

28. See the name of **n**-variable in ***Watch (Watches) Window*** (to show/hide ***Watch (Watches) Window*** use ***View*** > ***Watch Window***).

29. Repeat pos. 26-28 for s-variable.

30. Put cursor in program, do ***F8*** and follow the changes of variables in ***Watch Window***. Do ***F8*** till the end of program.

31. Change the active row **n=(n+s)/2** to **n=(n+s)/0**.

32. Run program (see pos. 20).

33. Write **5** in open dialog. Press ***OK***.

34. Read the message in ***Error Dialog*** and select ***Debug***.

35. Change the row **n=(n+s)/0** to **n=(n+s)/2** and do ***Run*** > ***Continue***.

36. Run program.

37. Write **five** in open dialog. Press ***OK***.

38. Read the message in ***Error Dialog*** and select ***Debug***.

39. See the error place and the value of **s**-variable in ***Watch Window***.

40. ***Run*** > ***Reset*** (we can't fix this error during runtime)

41. Close VBA window and save file.

42. ***Ribbon*** > ***Разработчик*** (***Developer***) > ***Код*** (***Code***) > ***Макросы*** (***Macros***).

43. Select **program_1** in list and press ***Выполнить*** (***Run***).

Report

1. Write work title with number, your name (first & last) and name of your group.

2. Answer the following questions (in writing, without text of questions):

a) How to open Visual Basic (VB/VBA) environment in MS Excel?

b) How to add module in VBA project?

c) How to show/hide Project Explorer?

d) How to save Excel file with macros?

e) How to run VB-program?

f) How to run program in step by step mode?

g) How we can follow the value of variable (expression) during runtime?

h) Describe the typical sequence to fix errors in program code.

LABORATORY WORK № 2.
VARIABLES. OPERATORS. BUILT-IN FUNCTIONS

Summary

Basic structure of Visual Basic (VB) (Visual Basic for Application (VBA)) programs. Using of variables, math and text operators and functions.

Table of build-in VB (VBA) operators and functions

Operator/Function	Purpose	Syntax
Math		
+	Addition	<number1>+<number2>
–	Subtraction	<number1>–<number2>
*	Multiplication	<number1>*<number2>
/	Division	<number1>/<number2>
\	Exact Division	<number1>\<number2> result – the whole part from division
mod	Remainder of the division	<number1> mod <number2>
^	Power	<number1> ^ <number2> number1 to number2 power (for number1<0, number2 must be integer)
Abs	Absolute value of a number	Abs(<number>) Returns Null for not numbers
Atn	Arctangent of a number	Atn (<number>) Returns angle in radians [- π /2 до + π /2] Arccos(<number>)=Atn(–<number>*Sqr(–<number> * <number>+1))+2*Atn(1), range for number: (-1..1)
Cos	Cosine	Cos(<number>) Returns value in range [–1… +1]; number – radian value

Exp	Exhibitor of number	Exp(<number>) Returns e^{number}
Fix, Int	Getting of entire part of a number	Fix(<number>); Int(<number>) Fix(1.7) returns 1; Int(1.7) returns 1; Fix(-1.7) returns -1; Int(-1.7) returns -2; Fix(-1.2) returns -1; Int(-1.2) returns -2;
Log	Natural logarithm of a number	Log(<number>) number > 0; $Log_X y=Log(y)/Log(x)$
Rnd	Random value	random value from the range [0;1)
Sgn	Number sign	Sgn(<number>) returns 1 for number>0; return 0 for number=0; returns -1 for number<0
Sin	Sine	Sin (<number>) Returns value in range [–1… +1]; number – radian value
Sqr	Root from a number	Sqr(<number>) number >=0
Tan	Tangent	Tan(<number>) number – radian value
Logical		
And	Logical 'And'	<logical value1> And <logical value2> True And True – returns True; True And False – returns False; False And False – returns False
Or	Logical 'Or'	<logical value1> And <logical value2> True Or True – returns True; True Or False – returns True; False Or False – returns False

Not	Logical 'Not'	Not <logical value> Not True – returns False; Not False – returns True
<, >, >=, <=, <>	Comparison operators	<number1> < <number2> if number1 < number2 – returns True; if number1 >= number2 – returns False
Date		
Now	Getting current date	Now()
Year	Getting year from the date	Year(<date>)
Month	Getting month (sequence number) from the date	Month(<date>)
Day	Getting day (sequence number) from the date	Day(<date>)
Hour	Getting hour from the date	Hour(<date>)
Minute	Getting minute from the date	Minute(<date>)
Second	Getting second from the date	Second(<date>)
Text		
& оператор	Connection of text strings	<string1> & <string2> ... & <stringN>
UCase	Converts string to upper case	UCase(<string>)
LCase	Converts string to lower case	LCase(<string>)
InStr	Execute search of one string in another one	InStr(<string1>,<string2>) returns first position of string1 in string2; without result – returns 0
Left	Returns of specified number of symbols from the start of string	Left(<string>,<number of symbols>)
Right	Returns of specified number of symbols from the end of string	Right(<string>,<number of symbols>)
Mid	Returns specified number of symbol form the specified position from string	Mid(<string>,<number1>,[<number2>]) string – source string; number1 – start position;

		number2 – number of symbols; if number2 omitted – till the end of string
LTrim	Delete all space-symbols from the start of string	LTrim(<string>)
RTrim	Delete all space-symbols from the end of string	RTrim(<string>)
Trim	Delete all space-symbols from the both sides of string	Trim(<string>)
Len	Returns quantity of symbols in text string	Len(<string>)
Chr	Returns of symbol by its ASCII-code	Chr(<ASCII-code>) Chr(13) – returns Enter - text command
Asc	Returns of ASCII-code by its symbol	Asc(<symbol>)

Example

Part 1

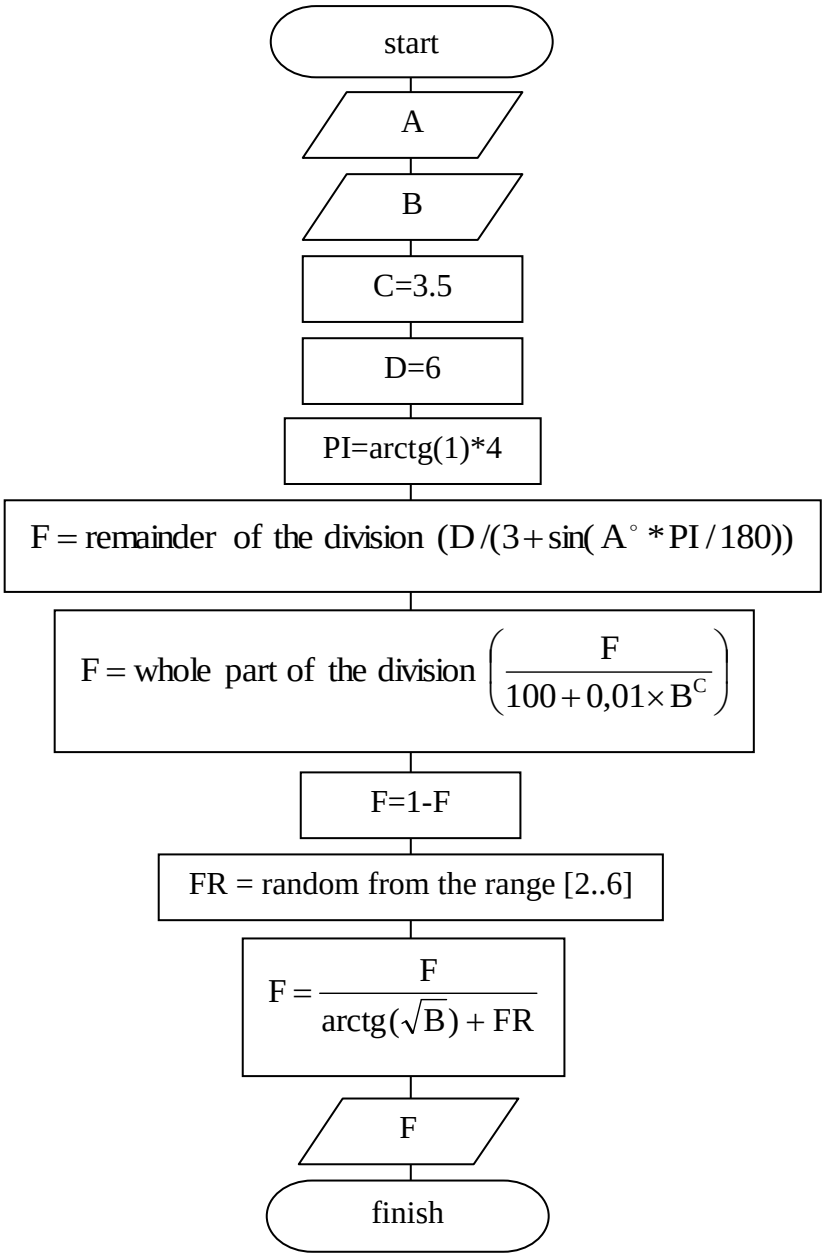
Make algorithm for expression calculation:

$$F = \frac{1 - \text{whole part of the division} \left(\frac{\text{remainder of the devision } (D/(3+\sin(A^\circ)))}{100 + 0{,}01 \times B^C} \right)}{\text{arctg}(\sqrt{B}) + \text{random from the range}[2..6]}$$

Write VB-program for this algorithm. The value of arguments A and B must be typed during runtime.

Solving for Part 1

Algorithm for expression calculation:

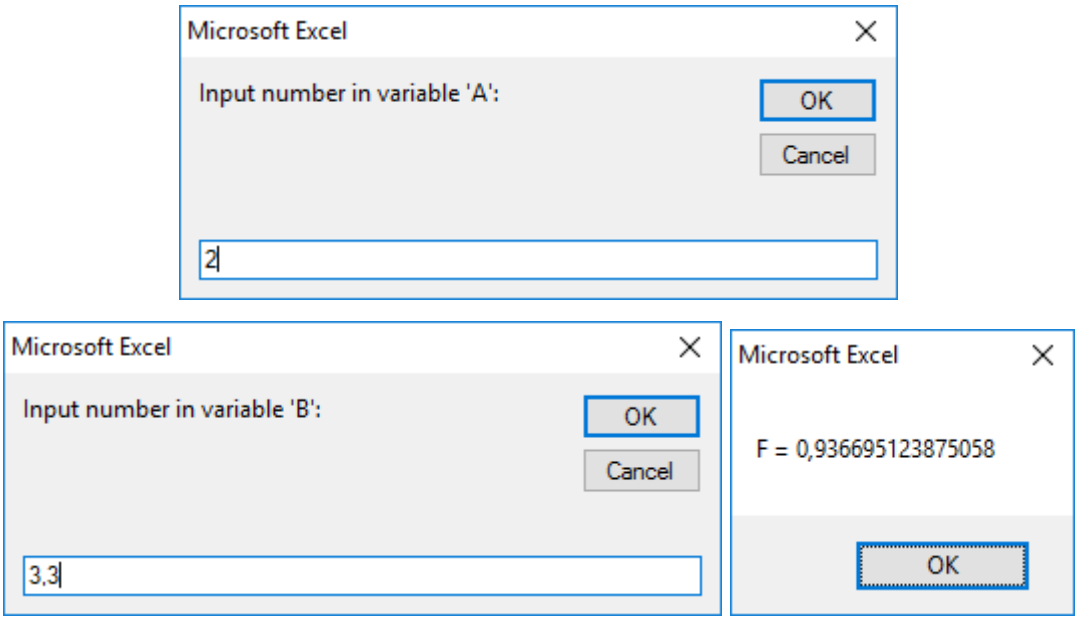


Program for this algorithm:

```
Sub program_1()
Dim A As Double
Dim B As Double
Dim C As Double
Dim D As Double
Dim PI As Double
Dim FR As Double
Dim F As Double
```

```
A = InputBox("Input number in variable 'A':")
B = InputBox("Input number in variable 'B':")
C = 3.5
D = 6
PI = Atn(1) * 4
F = D Mod (3 + Sin(A * PI / 180))
F = F \ (100 + 0.01 * (B ^ C))
F = 1 – F
FR=Rnd() * 4 + 2
F = F / (Atn(Sqr(B))+FR)
MsgBox "F = " & F
End Sub
```

Results:



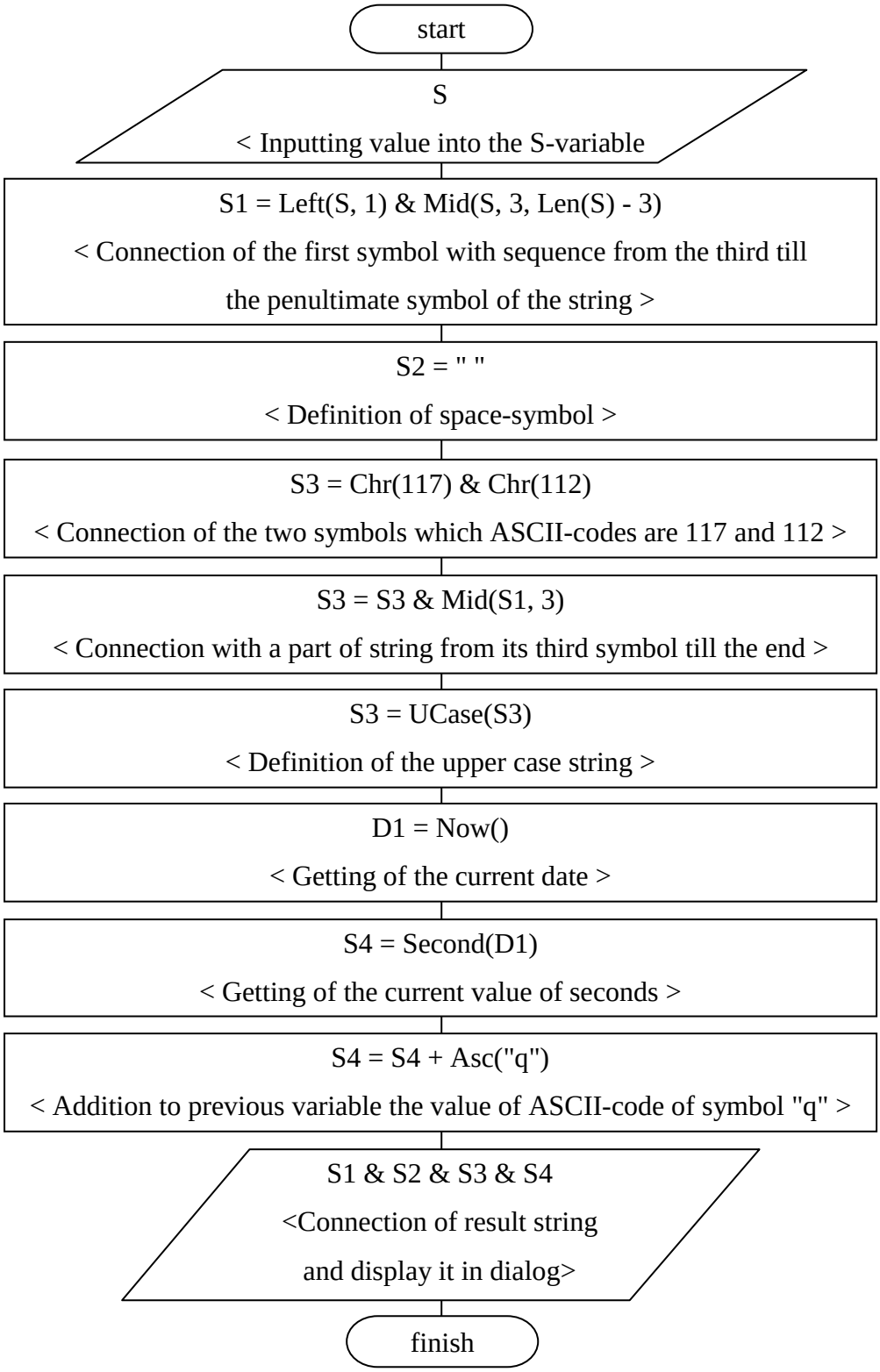
Part 2

We need to construct string which consists of following parts: 1) the string S without the second and the last symbol; 2) the space-symbol; 3) the upper case string1 in which first two symbols replaced by the two symbols which ASCII-

codes are 117 and 112; 4) the string – sum of current value of seconds and ASCII-code of symbol "q". String S must be typed during runtime.

Solving for Part 2

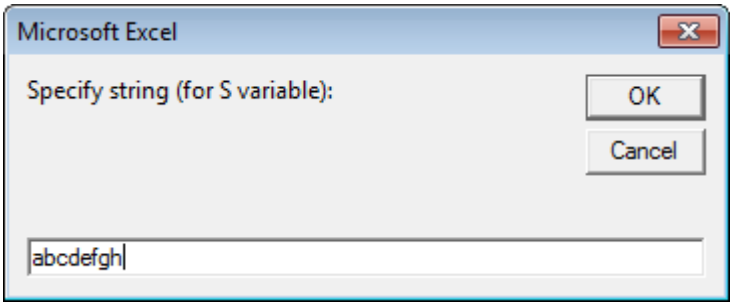
Algorithm for task solving:

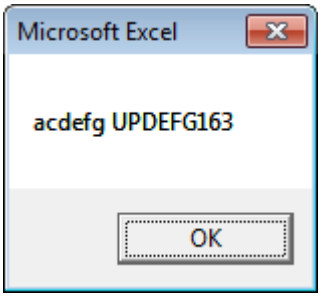


Program for this algorithm:

```
Sub program_2()
Dim S As String
Dim S1 As String
Dim S2 As String
Dim S3 As String
Dim S4 As String
Dim D1 As Date
S = InputBox("Specify string (for S variable):")
S1 = Left(S, 1) & Mid(S, 3, Len(S) - 3)
S2 = " "
S3 = Chr(117) & Chr(112)
S3 = S3 & Mid(S1, 3)
S3 = UCase(S3)
D1 = Now()
S4 = Second(D1)
S4 = S4 + Asc("q")
MsgBox S1 & S2 & S3 & S4
End Sub
```

Results:





Task

Part 1

Make algorithm for expression calculation (see table of ***Variants***).

Write VB-program for this algorithm. The value of arguments A and B must be typed during runtime.

Part 2

We need to construct string which consists of following parts (see table of ***Variants***). String S must be typed during runtime.

Variants

Variant №	Description	
1	Part 1	$F = \frac{\lvert A - B \rvert \times \sin(3 \times A^{\circ}) - \mathrm{tg}(D^{\circ})}{1 + \ln B}$
	Part 2	1) Upper case string from the first symbol till the third symbol (inclusively) of string S; 3) space-symbol; 3) the string from the fourth till the last symbol of string S.
2	Part 1	$F = \text{remainder of the division } \left(\frac{A}{B}\right) + \sqrt{1 + e^{C} \times D} - C^{D}$
	Part 2	1) The string from the second till the fourth symbol (inclusively) of string S; 2) upper case string from the "before the penultimate" till the penultimate symbol of string S.

3	Part 1	$F = \text{whole part of the division } \left(\frac{A}{B}\right) - \text{arctg}\left(\frac{\lvert C - D \rvert}{C^D}\right)$
	Part 2	1) The string which consists of ASCII-codes of first three symbols of string S (codes must be separated by the space-symbol); 2) upper case string which consists of two last symbols of string S.
4	Part 1	$F = \text{whole part of the division } \left(\frac{A+B}{B}\right) + \frac{\text{arctg}(C+D)}{\text{random from the range}[1...3]}$
	Part 2	1) Upper case string from the first till the second symbol (inclusively) of string S; 2) upper case third symbol of string S; 3) ASCII-code of the last symbol of string S.
5	Part 1	$F = \sqrt{1 - A} - B^{\left\lvert \frac{C+D}{\cos(C^\circ)} \right\rvert}$
	Part 2	1) The string from the second till the last symbol (inclusively) of string S; 2) ASCII-code of the fourth symbol of string S; 3) The string from the "before the penultimate" till the penultimate symbol of string S.
6	Part 1	$F = \left(A + \frac{1}{e^{B+C}}\right) \times (\ln D)^D$
	Part 2	1) ASCII-code of the last symbol of string S; 2) the string S without the second and the third symbols; 3) the string from the second till the penultimate symbol (inclusively) of string S.
7	Part 1	$F = (\log_7 A) + \frac{\sqrt{B}}{C^D + \cos(B^\circ)}$
	Part 2	1) The string S without the second and the penultimate symbol; 2) fourth symbol of string S; 3) sequence of three symbols, which ASCII-codes are 109, 97, 217.
8	Part 1	$F = \left(\frac{1}{A+B} + \lvert D \rvert^e\right) \times \left(\cos(C^\circ) - \text{whole part of the division } \left(\frac{B}{D}\right)\right)$
	Part 2	1) The string from the third till the fourth symbol (inclusively) of string S; 2) sequence of four symbols, which ASCII-codes are 115, 104, 105, 112; 3) the string – current value of minutes.

9	Part 1	$F = \sqrt{\frac{e^{\lvert 2-B \rvert}}{C + (1 - D \times \text{random from the range}[2...4])}}$
	Part 2	1) The string from the fourth till the last symbol (inclusively) of string S; 2) the last symbol of string S; 3) the string – the amount of symbols in string1 and string2.
10	Part 1	$F = \left(1 - \frac{A}{\lvert C - 1 \rvert}\right) + \log_{D+3}(B^2)$
	Part 2	1) Sequence of four symbols, which ASCII-codes are 119, 105, 110, 103; 2) the string from the "before the penultimate" symbol (inclusively) till the end of the string S; 3) space-symbol; 4) the string S without the second and the third symbols.
11	Part 1	$F = 2^e + \left(\text{remainder of the division}\left(\frac{A}{C + \cos((10 + D)^\circ)}\right)\right) \times (B - 1)$
	Part 2	1) Upper case string which consists of four symbols, which ASCII-codes are 115, 110, 111, 119; 2) space-symbol; 3) the string S without the second symbol.
12	Part 1	$F = 2^{A - \frac{B}{C} \times \cos((2 \times D)^\circ)} + \sqrt{\text{random from the range}[5...8]}$
	Part 2	1) The string S without the second and the last symbol; 2) the string S which third and fourth symbol replaced by the two symbols which ASCII-codes are 105 and 110.
13	Part 1	$F = \sqrt{\cos(A^\circ) + B^D} + \log_{2 \times \lvert C \rvert} D$
	Part 2	1) The string – current day of month; 2) the string S in which first three symbols replaced by the three symbols which ASCII-codes are 99, 97 and 116.
14	Part 1	$F = \left(1 + \ln A^{\frac{A}{B}}\right)^{\cos((1/C)^\circ)} + \sqrt{D}$
	Part 2	1) The string – current value of seconds; 2) the string S without the second and the penultimate symbol.

15	Part 1	$F = e^{\frac{1}{\sqrt{A+2\times B}}} + \ln(16\times C) - \mathrm{arctg}(D)$
	Part 2	1) The upper case string S without three last symbols; 2) the string S in which last three symbols replaced by the three symbols which ASCII-codes are 100, 111 and 103.
16	Part 1	$F = \left(1 - \frac{\sqrt{1-A^B}}{\cos(C^\circ)}\right) + \left\lvert \text{random from the range}[6...8] \right\rvert^2$
	Part 2	1) The string S without the fourth and the last symbol; 2) the string – sum of current value of minutes and seconds; 3) the string – the length of string2.
17	Part 1	$F = \left(1 - \frac{1}{B}\right)^{\sin(A^\circ)} + \sqrt{C^e + D}$
	Part 2	1) Sequence of four symbols, which ASCII-codes are 114, 97, 105, 110; the first and the third symbols must be in upper case; 2) the string S without the second, the third and the fourth symbols.
18	Part 1	$F = \frac{A}{D^{(1-A-B)} + \sqrt{C}} \times \left\lvert \mathrm{arctg}(D) \right\rvert$
	Part 2	1) The string S in which last two symbols replaced by the symbols which ASCII-codes are 116 and 111; 2) the string – current value of hours; 3) the string – amount of symbols in string1.
19	Part 1	$F = \frac{\log_A^{(B+\frac{1}{C})}}{\sqrt{D} + \text{random from the range}[1..3]}$
	Part 2	1) The string S without the third and the fourth symbol; 2) the string – current day of month; 3) space-symbol; 4) ASCII-code of symbol "v".
20	Part 1	$F = \cos(A^\circ) + \frac{\sqrt{B+1}}{\ln(C) + \text{random from the range}[3..5]}$
	Part 2	1) The string S in which the second symbol replaced by the symbol with ASCII-code value 100; 2) the string from the "before the penultimate" till the penultimate symbol (inclusively) of string S.

Report

1. Write work title with number, your name (first & last) and name of your group.
2. Your task.
3. Algorithm (block-scheme).
4. Program code (listing).
5. Program results (scheme of dialogs with input data and calculated values).

LABORATORY WORK № 3.
CONDITIONAL STATEMENTS

Summary

Visual Basic (VB) realization of algorithm for executing of the alternative sequences of actions.

Example

Part 1

Make algorithm for expression calculation:

$$y = \sqrt{\frac{2 - x}{\ln x}}$$

Expression has argument limits.

Write VB-program for this algorithm. The value of argument (x) must be typed during runtime.

Solving for Part 1

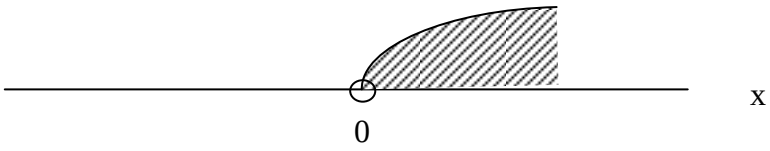
For y-function we have following argument limits.

$$\begin{cases} 1.\ x > 0 \\ 2.\ x \neq 1 \\ 3.\ (2 - x \geq 0 \text{ and } \ln x > 0) \text{ or } (2 - x \leq 0 \text{ and } \ln x < 0) \end{cases}$$

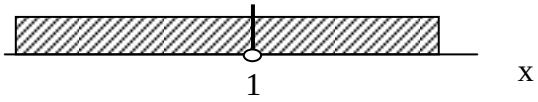
First limit is determined by the logarithm argument. The second limit depends on the division operation. Third limit is determined by the root operation

We can mark limits on x-axis.

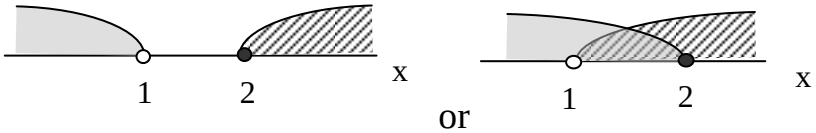
1.



2.

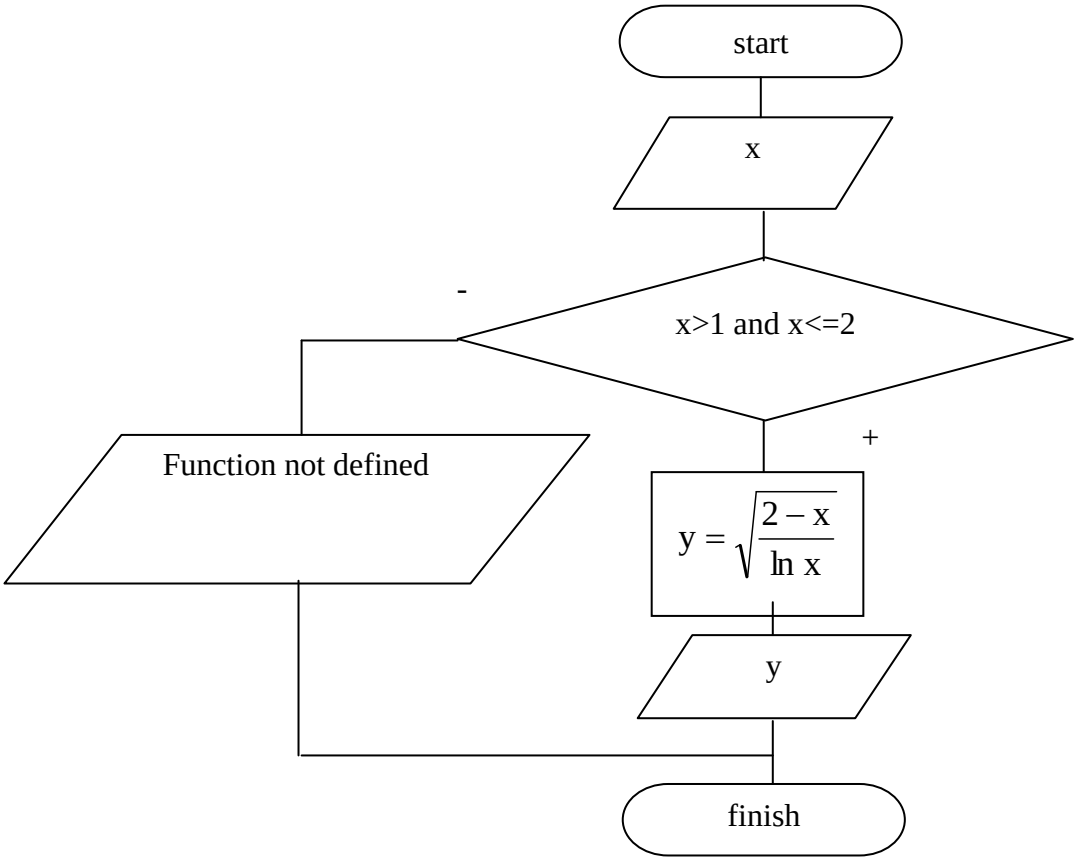


3.



So, summary limits for y = f(x): x = (1,2].

Algorithm for expression calculation $y = \sqrt{\frac{2-x}{\ln x}}$:

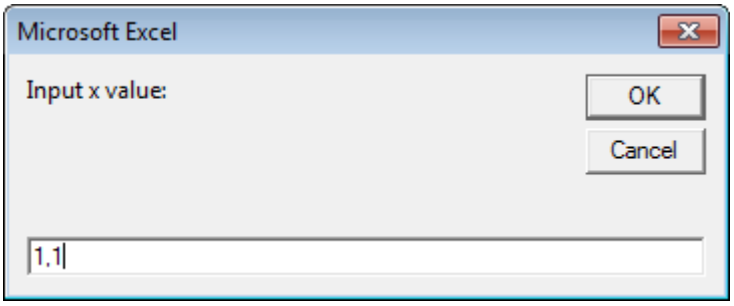


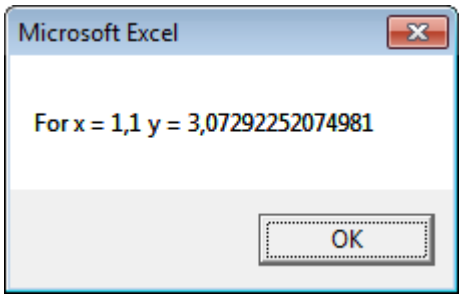
Program for this algorithm:

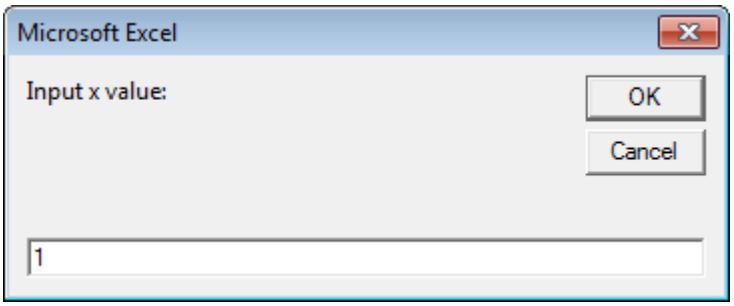
Sub program_1()

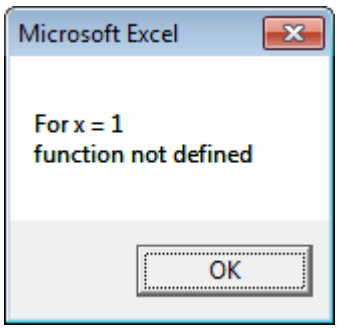
```
Dim x As Double
Dim y As Double
x = InputBox("Input x value: ")
If (x > 1 And x <= 2) Then
y = Sqr((2 - x) / Log(x))
MsgBox "For x = " & x & " y = " & y
Else
MsgBox "For x = " & x & Chr(13) & "function not defined"
End If
End Sub
```

Results:



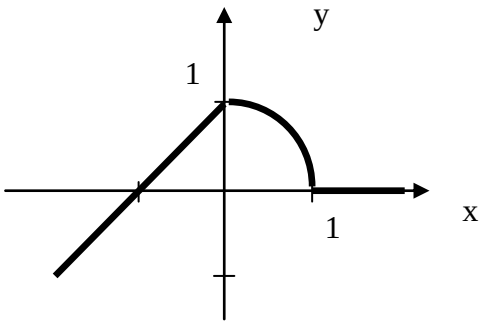






Part 2

We have graphic for y = f(x).



Make algorithm and write VB-program for calculating y = f(x). The value of argument (x) must be typed during runtime.

Solving for Part 2

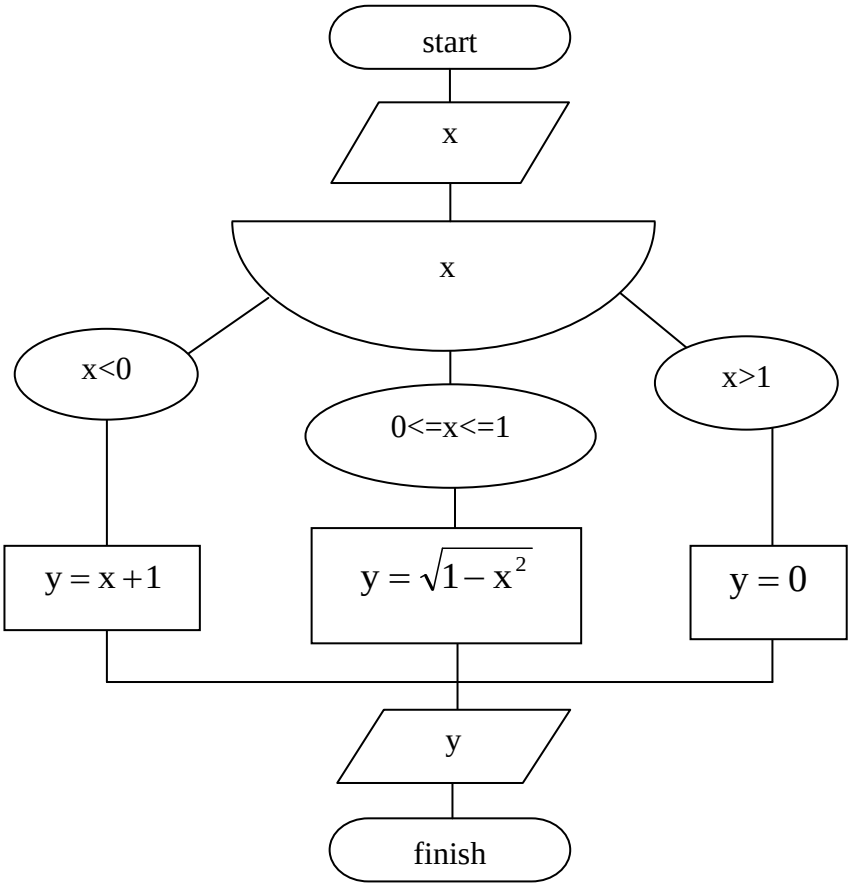
Function y = f(x) is unlimited and may be calculated in three ranges of x argument: 1. x = (-∞, 0), 2. x = [0,1], 3. x = (1, +∞):

range 1 is described by the equation: $y = x + 1$,

range 2 is described by the equation $x^2 + y^2 = 1$ or $y = \sqrt{1 - x^2}$,

range 3 is described by the equation $y = 0$.

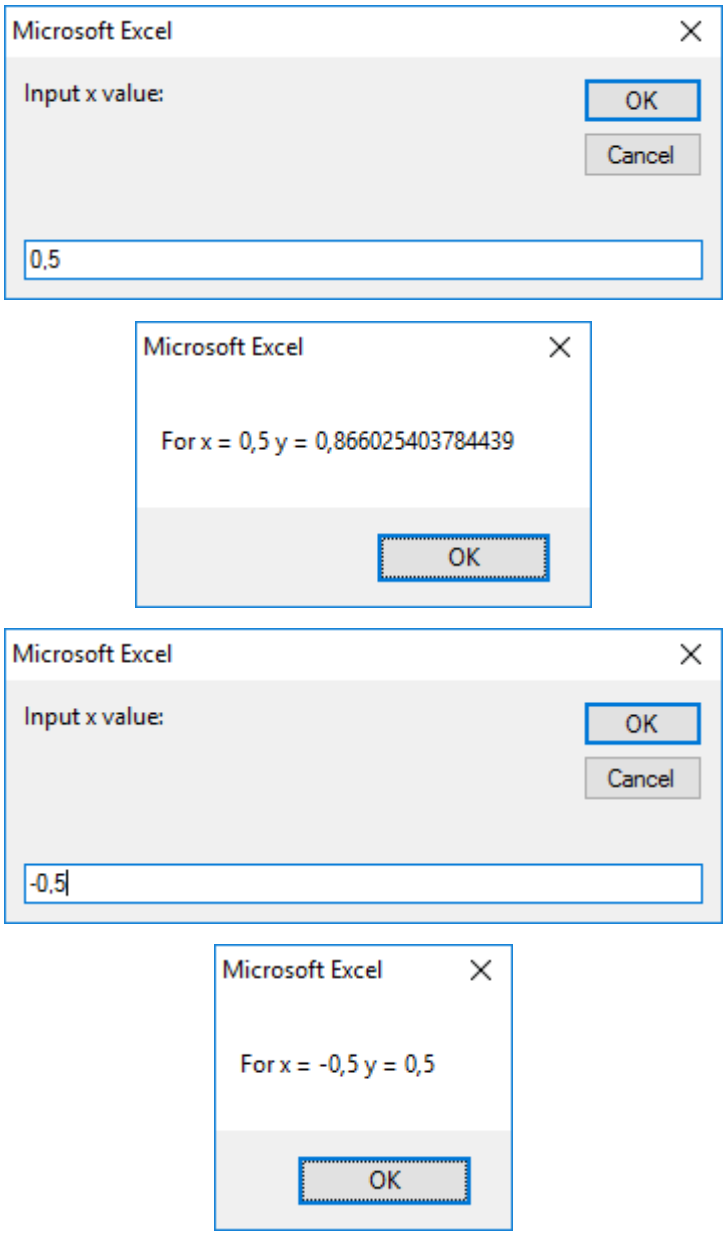
Algorithm for expression y=f(x) calculation:



Program for this algorithm:

```
Sub program_r2()
Dim x As Double
Dim y As Double
x = InputBox("Input x value: ")
Select Case x
Case Is < 0
y = x + 1
Case Is <= 1
y = Sqr(1 - x * x)
Case Else
y = 0
End Select
MsgBox "For x = " & x & " y = " & y
End Sub
```

Results:



Task

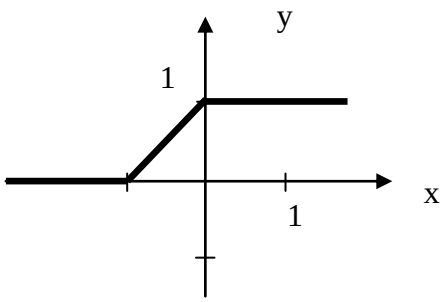
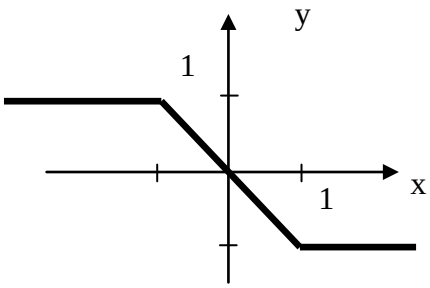
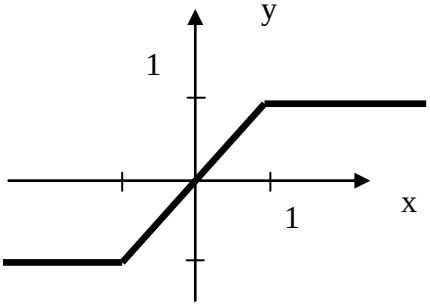
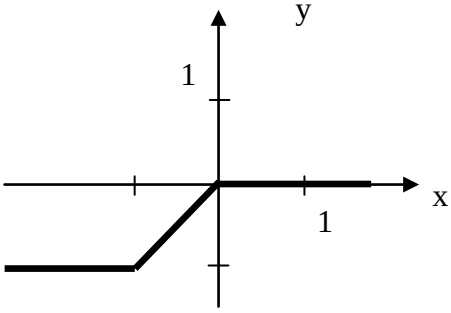
Part 1

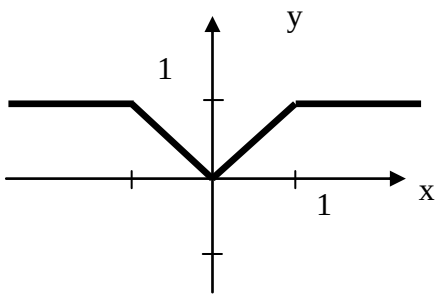
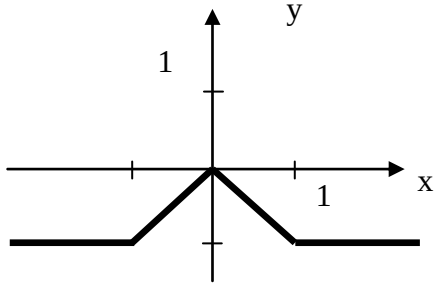
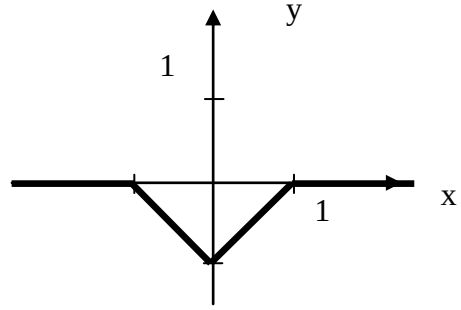
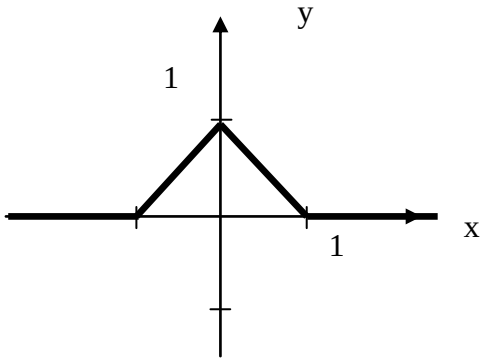
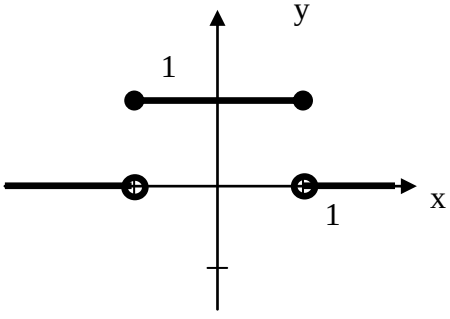
Make algorithm for expression calculation (see table of ***Variants***). Expression has argument limits. Write VB-program for this algorithm. The value of argument (x) must be typed during runtime.

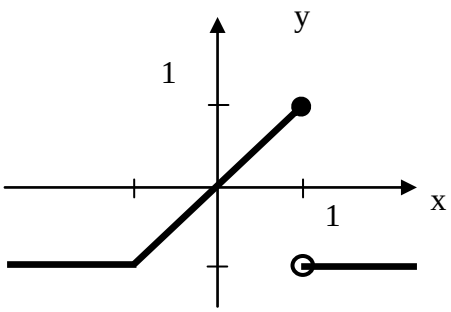
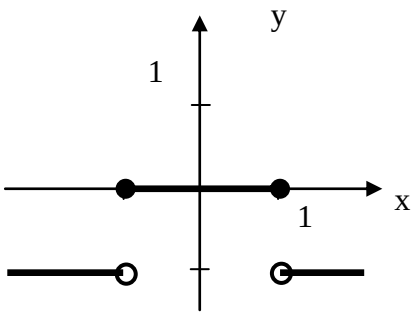
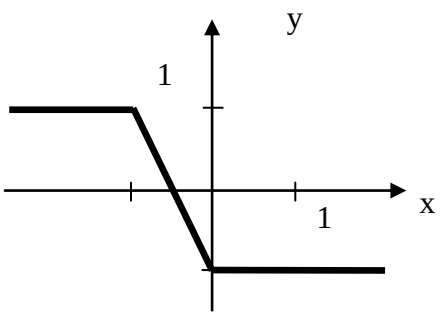
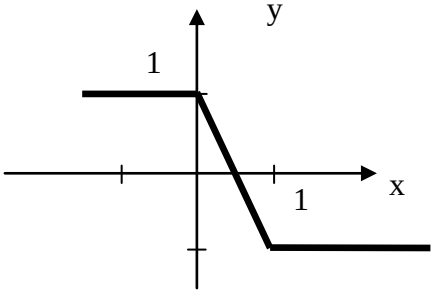
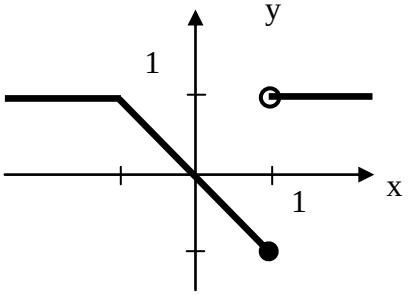
Part 2

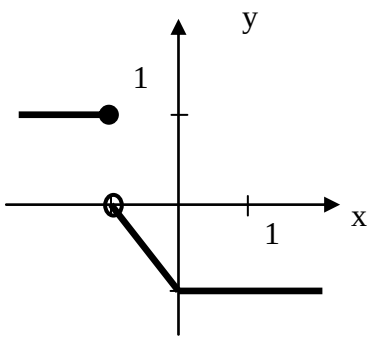
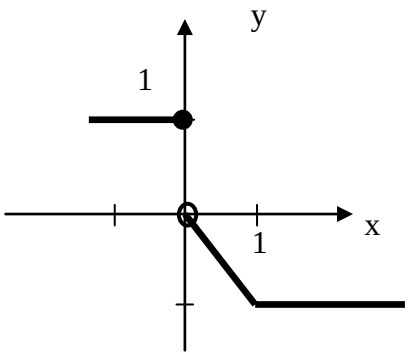
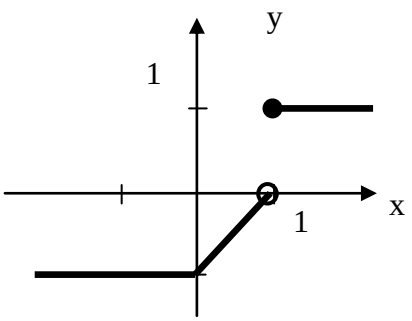
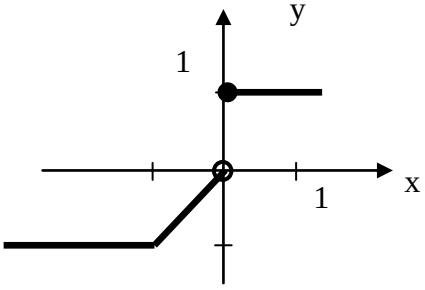
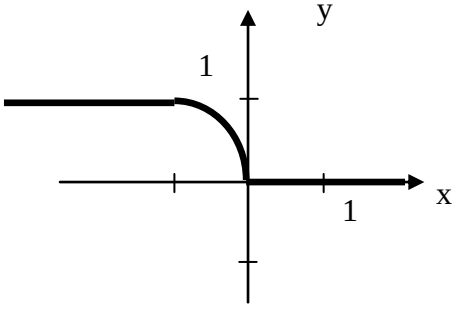
We have graphic for y = f(x) (see table of ***Variants***). Make algorithm and write VB-program for calculating y = f(x). The value of argument (x) must be typed during runtime.

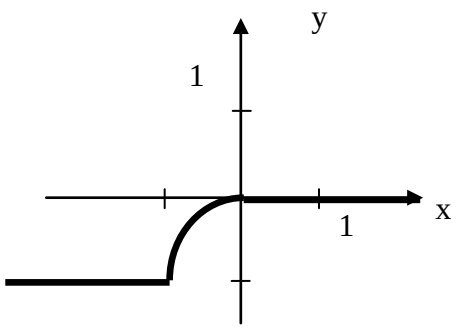
Variants

Variant №	Part 1	Part 2
1	$y = \frac{1}{x}$	
2	$y = \frac{1}{x^2 - x - 12}$	
3	$\sqrt{1-x}$	
4	$\sqrt{\frac{\ln x}{x}}$	

5	$y = \frac{1}{\sqrt{(2-x)}}$	
6	$y = \frac{\ln x}{x-1}$	
7	$y = \sqrt{1-\ln x}$	
8	$y = \sqrt{\frac{x+2}{x-2}}$	
9	$y = \frac{1}{\sqrt{\ln x}}$	

10	$y = \sqrt{\ln(x-1) \times \ln x}$	
11	$y = \frac{1}{x-1}$	
12	$\sqrt{x}$	
13	$\ln x$	
14	$y = \frac{1}{x \times (x-1)}$	

15	$y = \frac{\ln(4-x)}{\sqrt{x-3}}$	
16	$y = \frac{\ln(3-x)}{x^2-x-12}$	
17	$y = \sqrt{\frac{x^3}{x-2}}$	
18	$y = \sqrt{\frac{x-2}{(x+2)\times(3-x)}}$	
19	$y = (\ln x)\times\ln(2-x)$	

20	$y = \frac{1}{x^2 - x - 2}$	

Report

1. Write work title with number, your name (first & last) and name of your group.
2. Your task.
3. Algorithm (block-scheme).
4. Program code (listing).
5. Program results (scheme of dialogs with input data and calculated values).

LABORATORY WORK № 4.
CYCLIC OPERATORS

Summary

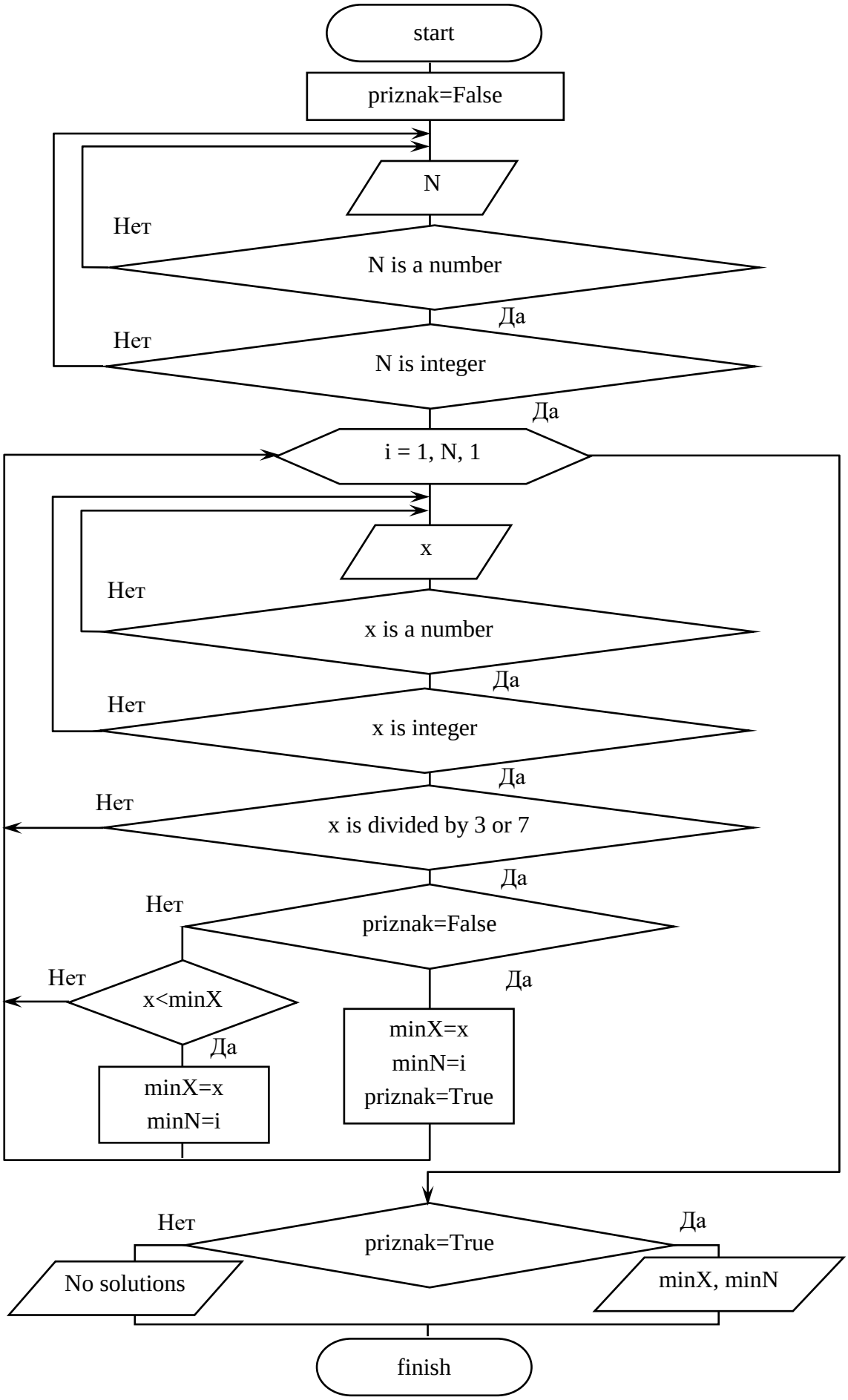
Visual Basic (VB) realization of algorithms for sequence of actions ("body") which are repeated in program several times.

Example

We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for searching a minimum number (in sequence) which is divided by 3 or 7. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.

Solving

Algorithm for solving this task:

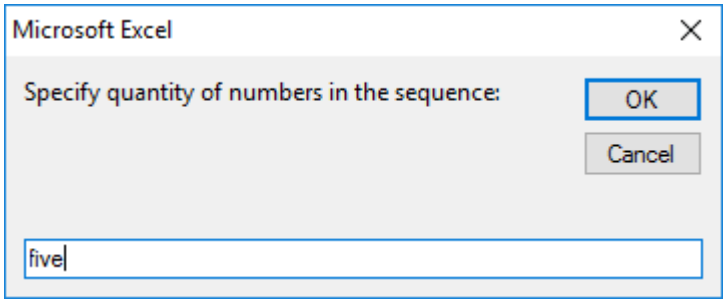

start
priznak=False
N
Нет
N is a number
Да
Нет
N is integer
Да
i = 1, N, 1
x
Нет
x is a number
Да
Нет
x is integer
Да
Нет
x is divided by 3 or 7
Да
Нет
priznak=False
Нет
x<minX
Да
Да
minX=x
minN=i
minX=x
minN=i
priznak=True
Нет
priznak=True
Да
No solutions
minX, minN
finish

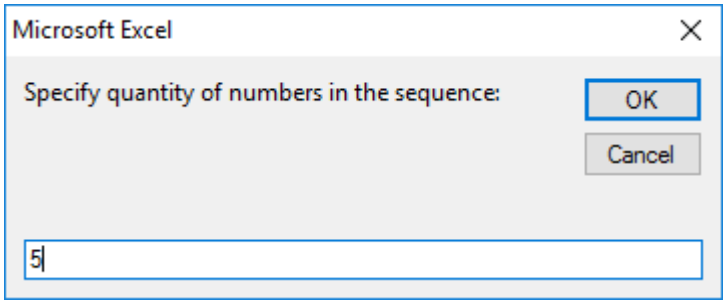
Program for this algorithm:

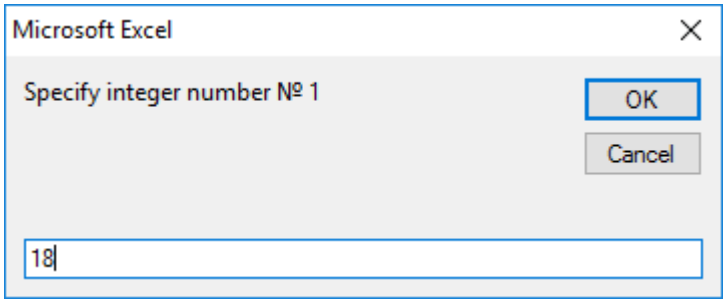
```
Option Explicit
Sub primer()
Dim N As Variant
Dim i As Integer
Dim x As Variant
Dim priznak As Boolean
Dim minX As Integer
Dim minN As Integer
priznak = False
Do
Do
N = InputBox("Specify quantity of numbers in the sequence:")
Loop Until IsNumeric(N)
Loop Until N = CInt(N)
For i = 1 To N Step 1
Do
Do
x = InputBox("Specify integer number № " & i)
Loop Until IsNumeric(x)
Loop Until x = CInt(x)
If x Mod 3 = 0 Or x Mod 7 = 0 Then
If priznak = False Then
minX = x
minN = i
priznak = True
ElseIf x < minX Then
minX = x
```

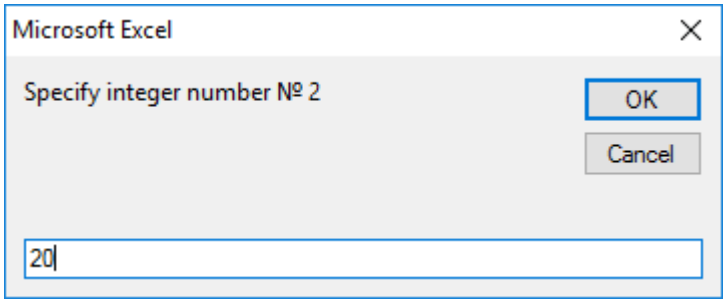
```
minN = i
End If
End If
Next i
If priznak = True Then
MsgBox "Minimum number which is divided by 3 or 7 is " _
& minX & Chr(13) & "it has № = " & minN
Else
MsgBox " We have no appropriate numbers"
End If
End Sub
```

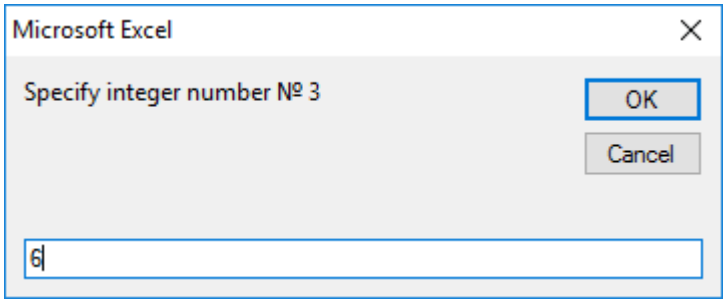
Results:

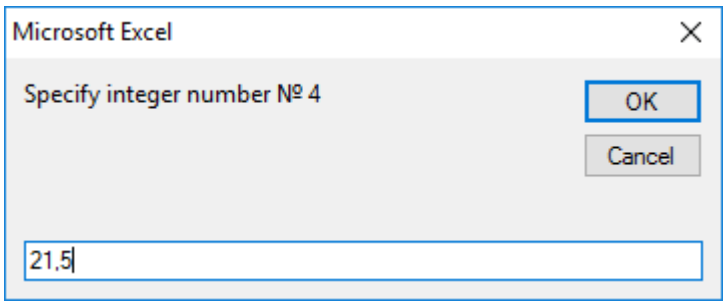


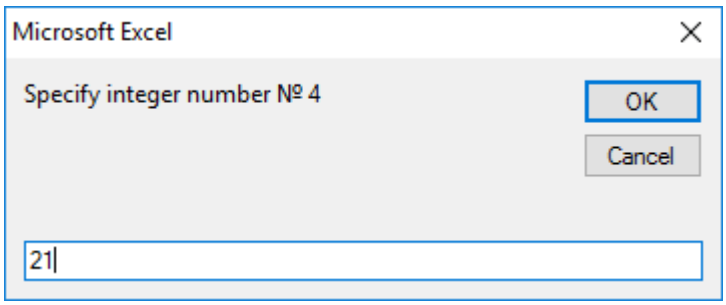


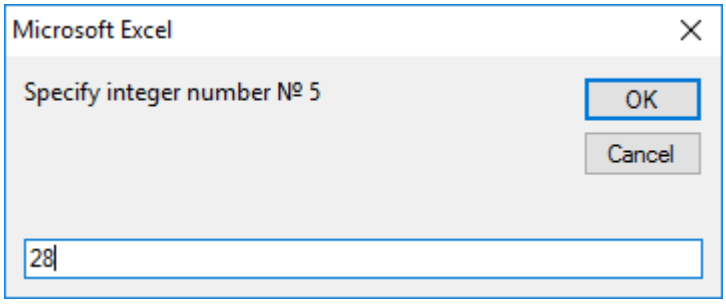


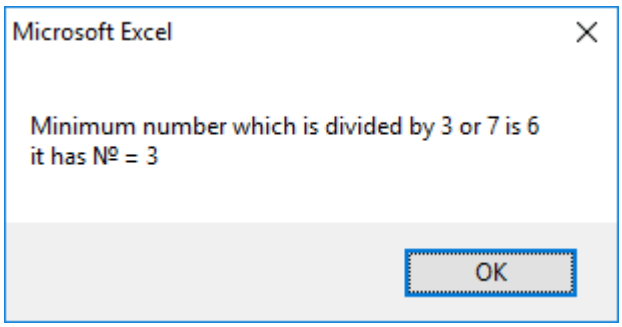

Microsoft Excel
Specify integer number № 2
OK
Cancel
20


Microsoft Excel
Specify integer number № 3
OK
Cancel
6


Microsoft Excel
Specify integer number № 4
OK
Cancel
21,5


Microsoft Excel
Specify integer number № 4
OK
Cancel
21


Microsoft Excel
Specify integer number № 5
OK
Cancel
28



Task

We need to write algorithm and appropriate VB(A)-program for the following variant (see table of ***Variants***). The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.

Variants

Variant №	Description
1	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) which are divided by 5, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
2	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) which come to end on "2", maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.

3	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) which are not come to end on "1", minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
4	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the negative numbers (in sequence), maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
5	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the positive numbers (in sequence), minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
6	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the odd numbers (in sequence), maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
7	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the even numbers (in sequence), minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and

	numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
8	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the even numbers (in sequence), maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
9	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) from the range [1,10], maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
10	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) from the range [-5,5], minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
11	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) which come to end on "0", maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
12	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all

	the integers (in sequence), minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
13	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the positive numbers (in sequence), maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
14	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of negative numbers (in sequence), minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
15	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) which is divided by 2 or 11, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
16	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) with odd integer part, minimum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.

17	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) with even integer part, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
18	We have variable sequence of integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) with absolute value lower then 10, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
19	We have variable sequence of positive integers. We need to write algorithm and appropriate VB(A)-program for calculating of multiplication of all the numbers (in sequence) which is divided by 3 and is not divided by 5, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.
20	We have variable sequence of numbers. We need to write algorithm and appropriate VB(A)-program for calculating of sum of all the numbers (in sequence) which integer part is divided by 3, maximum of those numbers and its sequence number. The quantity of numbers in the sequence (and numbers themselves) is need to specify during runtime. The control of all specified values is also needed.

Report

1. Write work title with number, your name (first & last) and name of your group.
2. Your task.
3. Algorithm (block-scheme).
4. Program code (listing).
5. Program results (scheme of dialogs with input data and calculated values).

LABORATORY WORK № 5.
THE FORMS AND THE CONTROLS

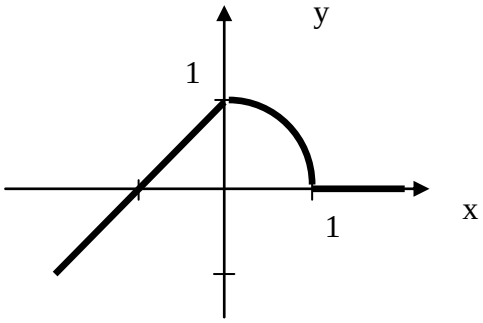
Summary

Constructing of user interface in Visual Basic (VB) (Visual Basic for Application (VBA)) with help of the forms and the controls.

Example

We have the task from the part 2 of laboratory work № 3 "CONDITIONAL STATEMENTS":

We have graphic for y = f(x).



Make algorithm and write VB-program for calculating y = f(x). The value of argument (x) must be typed during runtime.

Next we need to construct user interface for this task including:

1) image for the graphic y=f(x);

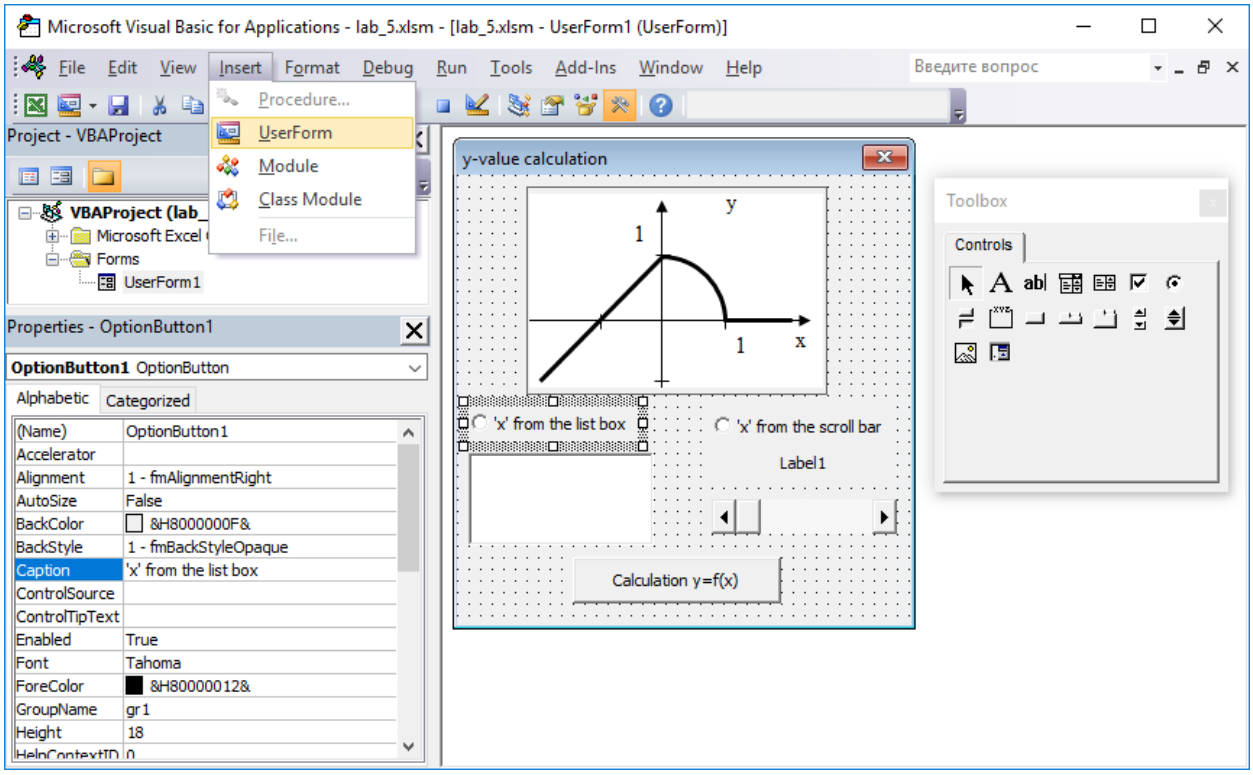
2) button for y-value calculation;

3) two option buttons to select the variant of specifying of x-value;

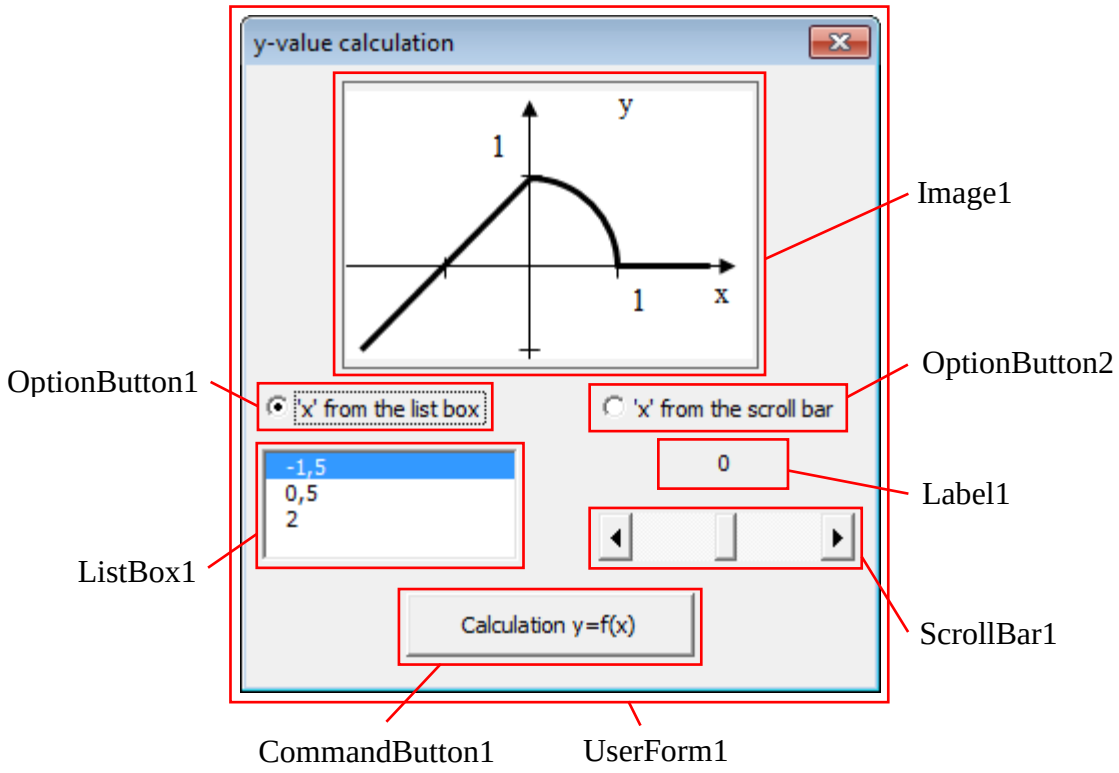
4) the appropriate controls to specifying x-value by two ways: a) the list box; b) the scroll bar.

Solving

Creating UserForm (in project) from the ***Menu*** in VBA environment, adding of the controls from the ***ToolBox***, adjusting properties using ***Properties Window***:



Scheme of user interface:



The list of x-value for the list box: -1.5, 0.5, 2.

The range of the x-values for the scroll bar: [-2…2].

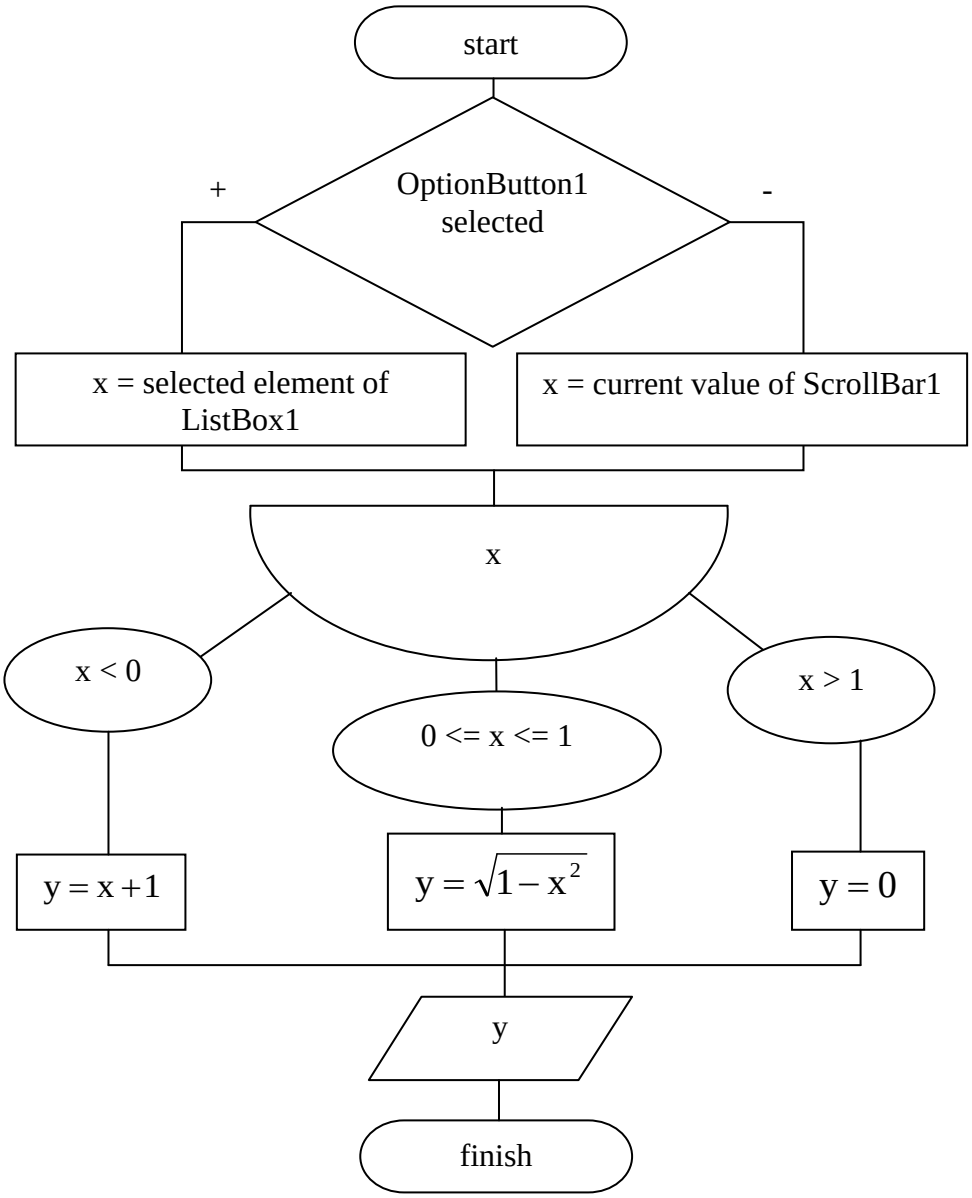
Properties of the user interface controls are specified in ***Properties Window***. The main properties of used controls are shown in table below.

Properties of the user interface controls

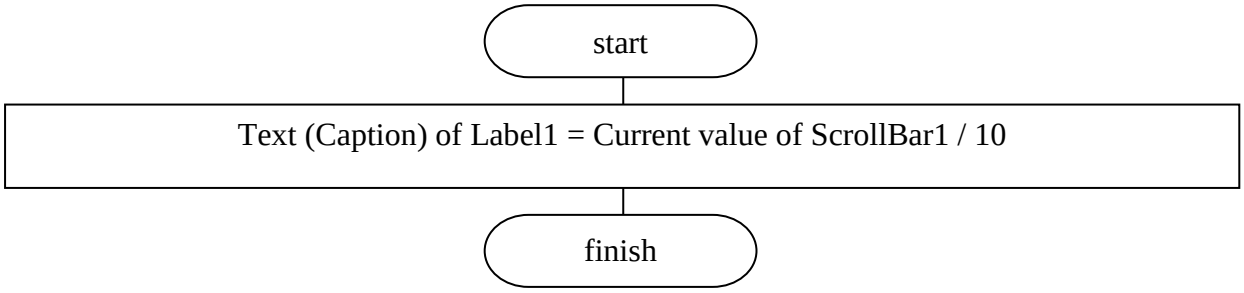
Property	The controls							
Name	User-Form1	Option-Button1	Option-Button2	ListBox1	Label1	Scroll-Bar1	Command-Button1	Image1
Width	240	88	94	96	96	96	108	156
Height	255	18	18	48	18	18	24	108
Left		6	132	6	132	132	60	36
Top		120	120	144	144	168	198	6
Caption	y-value calculation	'x' from the list box	'x' from the scroll bar				Calculation y=f(x)	
TextAlign					TextAlign Center			
GroupName		gr1	gr1					
Picture								sch.bmp

Algorithm for solving this task:

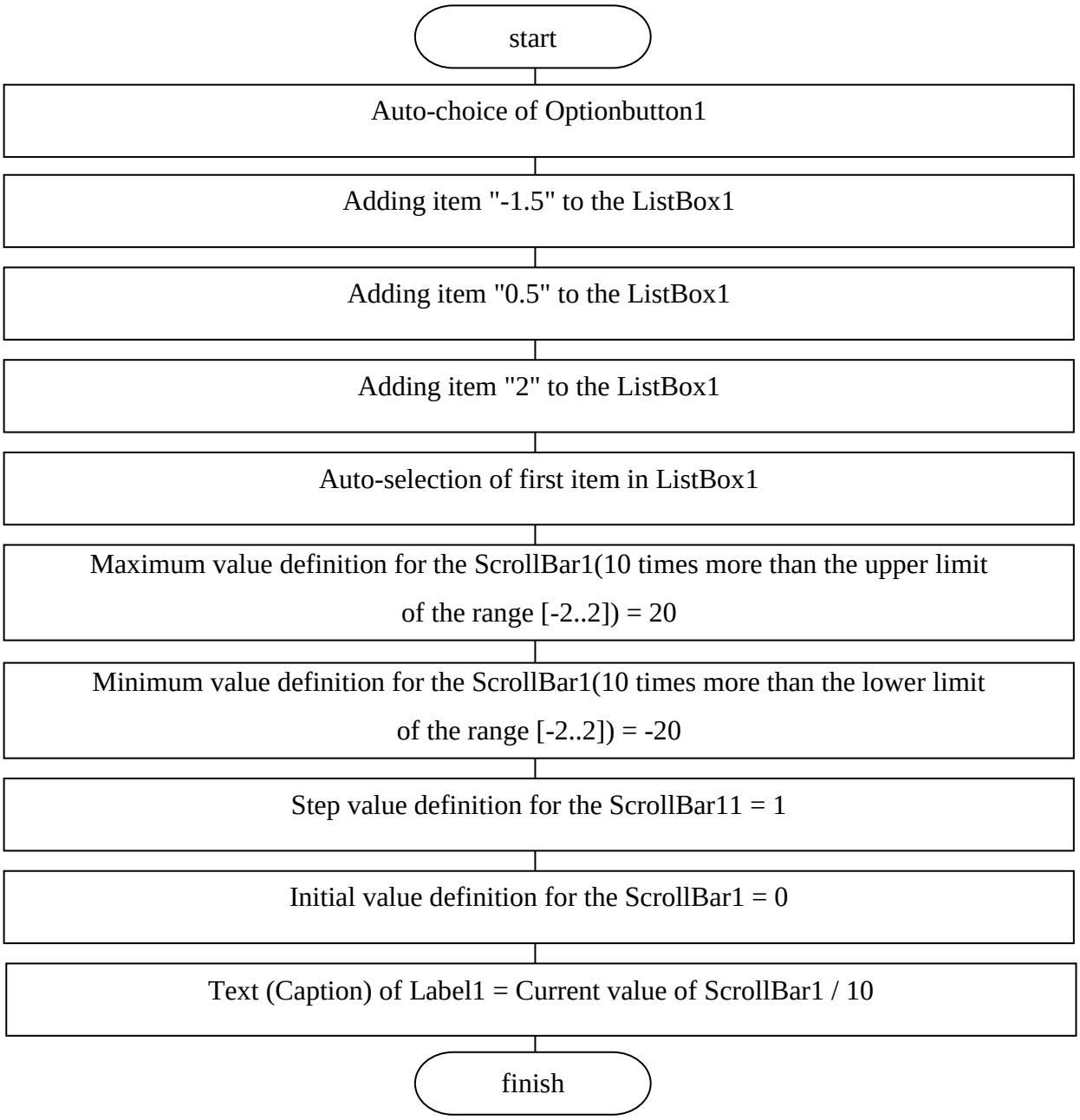
Procedure of click-event for CommandButton1:



Procedure of change-event for ScrollBar1:



Procedure of initializing-event for UserForm1:



Program for UserForm1 module:

```
' Click-event for CommandButton1
Private Sub CommandButton1_Click()
Dim x As Double
Dim y As Double
If OptionButton1.Value = True Then
x = CDbl(ListBox1.Value)
Else
x = ScrollBar1.Value / 10
```

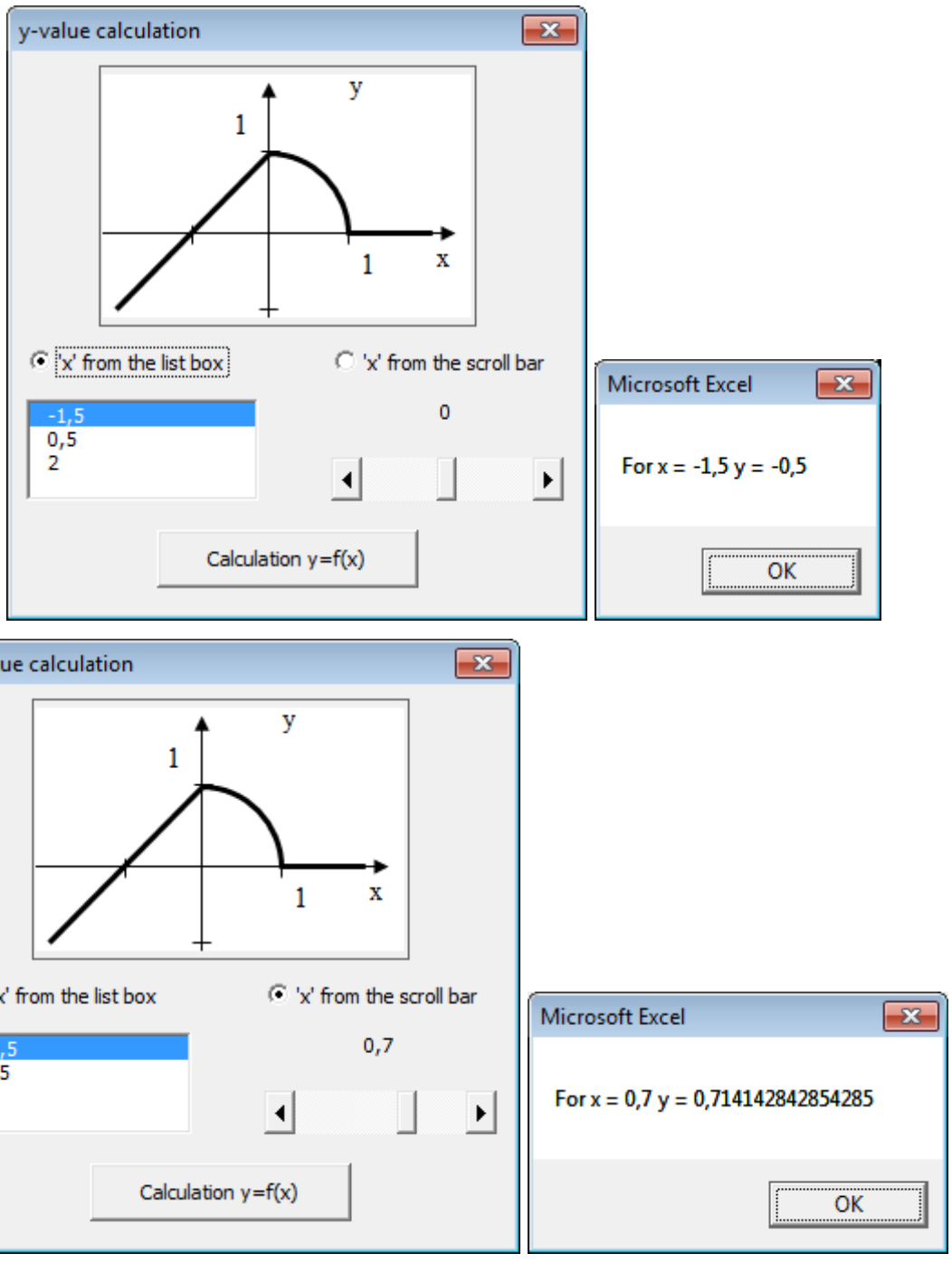
```
End If
Select Case x
Case Is < 0
y = x + 1
Case Is <= 1
y = Sqr(1 - x * x)
Case Else
y = 0
End Select
MsgBox "For x = " & x & " y = " & y
End Sub

' Change-event for ScrollBar1
Private Sub ScrollBar1_Change()
Label1.Caption = ScrollBar1.Value / 10
End Sub

' Initializing-event for UserForm1
Private Sub UserForm_Activate()
OptionButton1.Value = True
ListBox1.AddItem "-1,5"
ListBox1.AddItem "0,5"
ListBox1.AddItem "2"
ListBox1.ListIndex = 0
ScrollBar1.Max = 20
ScrollBar1.Min = -20
ScrollBar1.SmallChange = 1
ScrollBar1.Value = 0
Label1.Caption = ScrollBar1.Value / 10
```

End Sub

Results:



Task

We have the task from the part 2 of laboratory work № 3 "CONDITIONAL STATEMENTS":

We have graphic for y = f(x).

Make algorithm and write VB-program for calculating y = f(x). The value of argument (x) must be typed during runtime.

Next we need to construct user interface for this task including:

1) image for the graphic y=f(x);

2) button for y-value calculation;

3) two option buttons to select the variant of specifying of x-value;

4) the appropriate controls to specifying x-value by two ways (see table of ***Variants***).

Variants

Variant №	Description (Two methods for determine the x-argument value in User Form)
1, 4, 7, 10, 13, 16, 19	a) "Text Box", b) "List Box"
2, 5, 8, 11, 14, 17, 20	a) "Text Box", b) "Scroll Bar"
3, 6, 9, 12, 15, 18	a) "List Box", b) "Scroll Bar"

Report

1. Write work title with number, your name (first & last) and name of your group.
2. Your task.
3. Scheme of user interface.
4. Algorithm (block-scheme).
5. Program code (listing).
6. Program results (scheme of dialogs with input data and calculated values).