كلية المأمون الجامعة

قسم هندسة تقنيات القدرة الكهربائية

المرحلة الثانية

Computer Application and programming

Visual basic statements

In visual basic program (code) there are four basic parts, i.e. it is contains the following statements:

1- Declaration of variables and constants
2- Inputting variables
3- Operators for variables
4- Outputting variables

1- **Declaration of a variable and constants**

The declaration means defining the data type (variable or constant).

- **Variables**

   A variable is a space in memory filled with data (value, character, time or date).

Notes:

- Variable name must start with character (not number or function) and maximum length 256 character, and does not contain point or symbol.
- Variable name must not repeat for other values.

The variable has to be declared. Variable type is defined by its content .The content may be data as numeric or character or string or Boolean or date, or any type of data (called variant), these types declared as:

Dim variable name **as** type
<u>Or</u>
Global variable name **as** type

Note: The **Dim** declaration written in general part of the form or in any place in form or sub procedure which used for one form. While **Global** declaration used for all forms

The types of variables that are allowed in visual basic are stated in the table below.

Types of variables

Type	Value range	Declaration
1-Integer	$-32768 < x < 32768$	Dim x as integer
2-Long	$-2.1\,e+009 < x < 2.1\,e+009$	Dim x as long
3-Single	$1.4e-045 < |x| < 3.4e+038$	Dim x as single
4-Double	$4.9e-324 < x < 1.79e+308$	Dim x as double

| 5-String	65535 characters	Dim x as string
6-Boolean	True or false	Dim x as Boolean
7-Date	Computer time and date Jan 100<x< 31 Dec 9999	Dim x as date

- **Constants**

It is a space in memory filled with fixed value that will not be changed. Constant may be declared as:

Const constant name = value

Example: Declare x as a constant (P), then compute the area of a circle. Put suitable design.
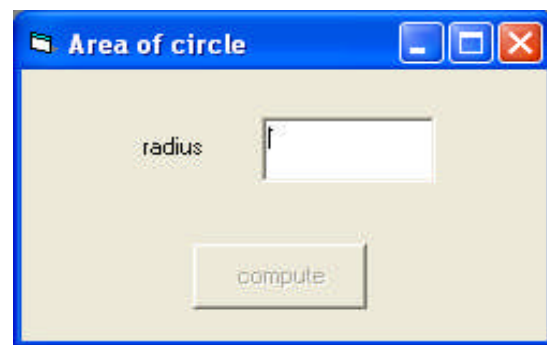
Sol:
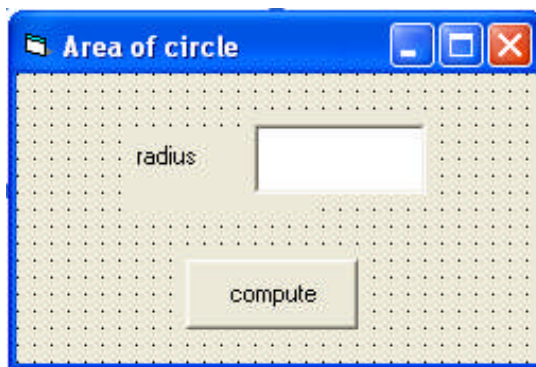
Form1	
caption	Area of a circle
label1	
Caption	radius
Text1	
text	
Command1	
caption	compute
Enabled	false

code stage:


```
Const p = 3.14159
Dim a, r As Single

Private Sub Text1_Change()
Command1.Enabled = True
End Sub

Private Sub Command1_Click()
r = Val (Text1.Text)
a = r ^ 2 * p
MsgBox ("area=" & a)
Text1.Text = " "
Text1.SetFocus
End Sub
```

2- Inputting variables

There are methods to input variable x as stated in the following:

Method of input	For all type of variable
In text tool	X=text$_{no}$.text
In input box	X=inputbox("prompt","title")

Note: To enter many variables we usually use the second method with loop.

3- Operators for variables

The operators that are used for variable are described in the following table

	+	addition
	-	subtraction
Arithmetic operators	*	multiplication
	/	division
	mod	Modulus –rest of division
	^	exponent
	=	equal
	<	Less than
Relational operators	<=	Less or equal
	>	Greater than
	>=	Greater or equal
	<>	Not equal

Note: The order of operations when executing arithmetic operation is:
Exponentiation - multiplication division and mod - finally addition and subtraction.

The mathematical representation must be written as visual basic representation in the code as following examples:

Mathematical representation	Programming representation
3(x+4y)	3*(x+4*y)
$X^2 + 4 \div 2$	$X\wedge 2 + 4/2$
$\sqrt[4]{16} + 3^3 + 10 - 5 \times 4 \div 3^2 - 2^3$	$16\wedge(1/4) + 3\wedge3 + 10 - (5*4)/3\wedge2 - 2\wedge3$
$\dfrac{5y}{x^2 - 4} + x - 1$	(5*y)/(x^2-4)+x-1
$\dfrac{e^{2x}}{\cos(2x) + \sin(x)}$	Exp(2*x)/(cos(2*x)+sin(x))

Assignment statement

There are many statements ways to fill a variable as follows:

Variable = expression

Expression may include variables, operations and functions as follows:
1- Numerical variable. For example: i=3
2- Mathematical relation. For example: x=a/b
3- Characters variable (string). For example: t="abc"
4- Boolean variable (logical). For example: p=true

Functions for variables

The numeric and string variables are the most common used variables in programming, therefore V.B provides the user with many functions to be used with a variable to perform certain operations or type convention. The most common functions for numerical variable x

Function	Description
Abs(x)	Absolute of x
Sqr(x)	Square root of x
Int(x)	Integer of x
Exp(x)	Exponential of x (e^x)
Fix(x)	Take the integer part
Sin(x), cos(x), tan(x)	Trigonometric functions
Log(x)	Natural logarithms
Len(x)	Number of character of variable x
Lcase(x)	Change the text x to small letters
Ucase(x)	Change the text x to capital letters
Cint(x)	Convert x to integer
Clong(x)	Convert x to long integer
Cdbl(x)	Convert x to double precision
Cstr(x)	Convert variable x to string
Val(x)	Convert string x to numerical variable

Note: the last five functions are called conversion functions.

The following functions for different x are given for comparison.

Function	output
X=lcase("MY NAME IS")	my name is
X=ucase("my name is")	MY NAME IS
int(2.5)	2
Int(-2.5)	-3
Fix(2.5)	2
Fix(-2.5)	-2

4- Outputting variables

There are methods to output variable x as stated in the following:

Method of output	For all type of variable
On form	Print x Note: in load event we must use the statement: (form1.show)
to text tool	$text_{no}$.text =X
to label tool	$Label_{no}$.caption=x
By message box	msgbox (x) Or msgbox ("remark"& x)

The instruction print could be very helpful to display data and used as follows:

Code	Description	example
print	To leave one line and print on next	
Print "a", "b", "c"	Use (,) to print a distance between outputs	a b c
Print "a"; "b"; "c"	Use (;) to print the outputs adjacent	abc
Print "a","b"; Print "c"	Print a, b then print c on the same line	abc

Example1: write a program to enter any text and compute its length. Put suitable design.
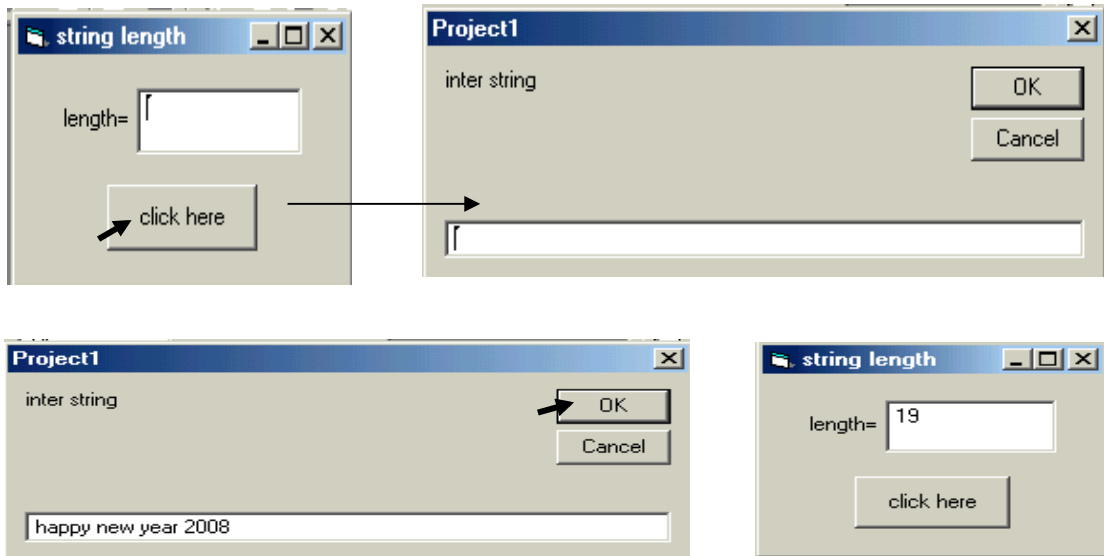Sol:

Design stage:

Form1	
Caption	String length
Command1	
caption	Click here
Label1	
Caption	Length=
Text1	
Text	
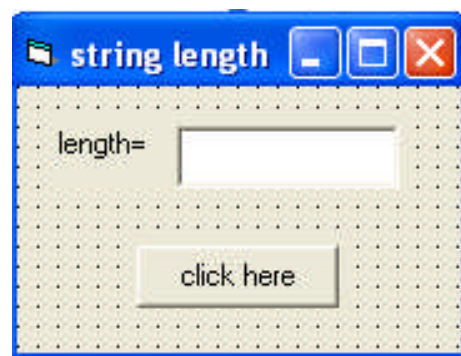
Code stage:
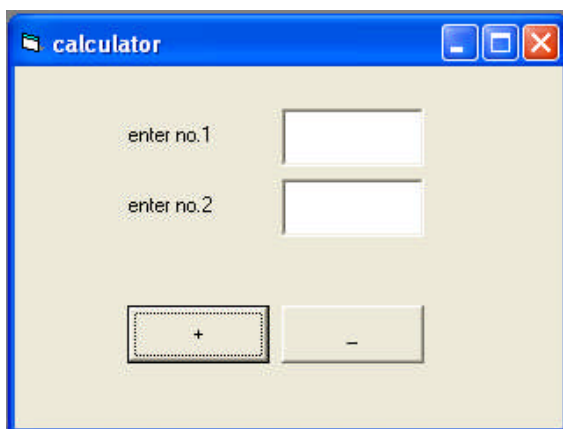Dim s As String
Private Sub Command1_Click()
s = InputBox("inter string")
L = Len(s)
Text1.Text = CStr(L)
End Sub

Running stage:

Example2: write a program to add and subtract two integer numbers after putting a suitable design. Use message box for outputting.

Design stage:

form	
caption	calculator
Command1	
caption	+
Command2	
Caption	-
Label1	
Caption	Enter no.1
Label2	
Caption	Enter no.2
text	text1, text2

Code stage:
Dim x, y, z as integer
Private sub command1_click ()
X=val(text1.text)
Y=val(text2.text)
Z=x + y
Msgbox("addition result="&z)
End sub

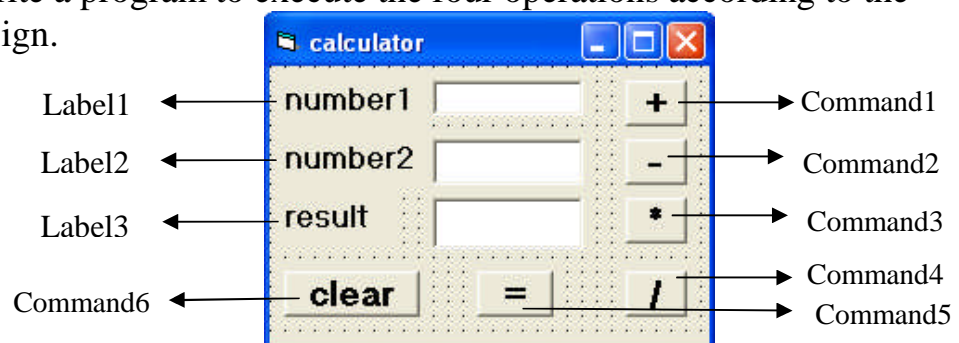Private sub command2_click ()
X=val(text1.text)
Y=val(text2.text)
Z=x - y
Msgbox("subtraction result="&z)
End sub

Running stage
Enter two values in text1 and text2. When click on command (+) or (-) the addition or subtraction result appears in message box.
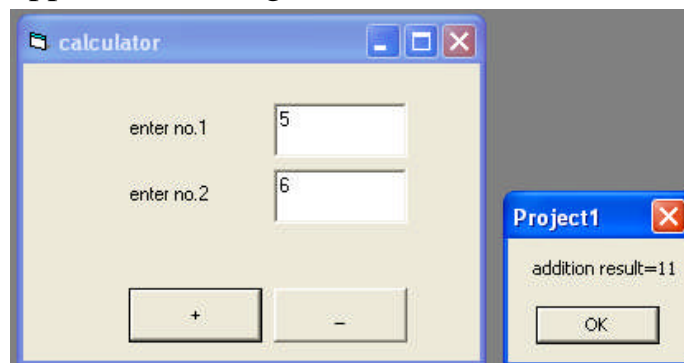
Example3: write a program to execute the four operations according to the following design.

Code stage:
Dim a,b, c as single
Private sub command1_click ()
a=val(text1.text)
b=val(text2.text)
c=a + b
End sub

```
Private sub command2_click ()
a=val(text1.text)
b=val(text2.text)
c=a - b
End sub

Private sub command3_click ()
a=val(text1.text)
b=val(text2.text)
c=a * b
End sub

Private sub command4_click ()
a=val(text1.text)
b=val(text2.text)
c=a / b
End sub

Private sub command5_click ()
Text3.text=cstr(c)
End sub

Private sub command6_click ()
Text1.text=" "
Text2.text=" "
Text3.text=" "
End sub
```

Example4: write a program to compute the functions: sine, cosine, integer value, square, absolute value.
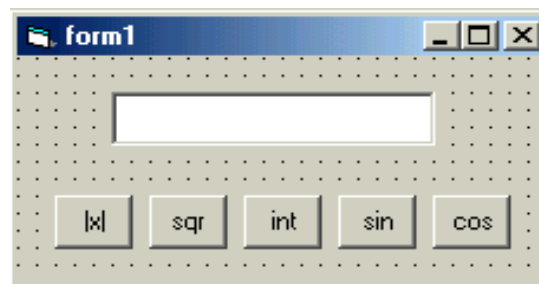sol:

Design stage:


```
Dim x, y As Single
Private Sub command1_click()
x = Val(Text1.Text)
y = Abs(x)
Text1.Text = CStr(y)
End Sub

Private Sub Command2_Click()
x = Val(Text1.Text)
y = Sqr(x)
Text1.Text = CStr(y)
End Sub
```
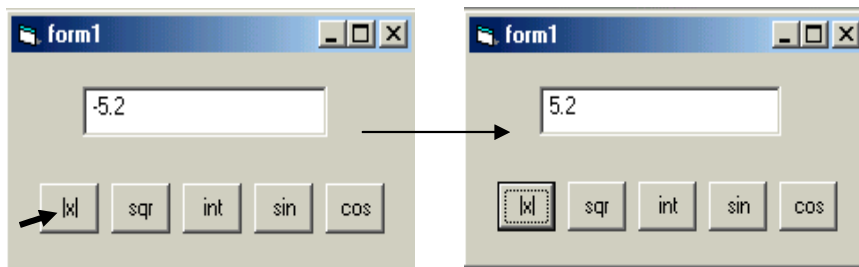
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```
Private Sub Command3_Click()
x = Val(Text1.Text)
y = Int(x)
Text1.Text = CStr(y)
End Sub

Private Sub Command4_Click()
x = Val(Text1.Text)
y = Sin(x * 3.14159 / 180)
Text1.Text = CStr(y)
End Sub

Private Sub Command5_Click()
x = Val(Text1.Text)
y = Cos(x * 3.14159 / 180)
Text1.Text = CStr(y)
End Sub
```

Running stage

Q1/ Write a Program to compute the area of triangle with design.

Q2/Write a program to enter the name of a student and two marks of any subject by input box then computes the average and display the name and average in two labels.

Q3/ Write a program to enter a real number then find its square after putting suitable design.

Q4/ Design a project with three forms, such that form1 contains two command buttons "Pethagors equation" and "area of triangle" such that when click on command1 "Pythagoras equation", form2 will be appear so in this form the third side of triangle will be compute with Pythagoras equation after enter the first and second side, and when click on "area of triangle" the third form displayed so that the area will be compute after entering the base and height. Use suitable output and input methods.

Q5/ Write a program to display the message below after click on command button "run".
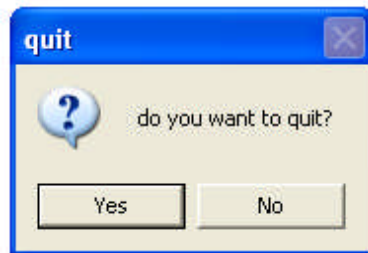
Q6/Write a program to display the time and the date, put a suitable design.