

Lab 10: Visual Basic Write-up due April 16

Overview.

- 1) Learn how to make a visual basic program
- 2) Program the Theis equation (again)

Create the programs and include pictures of the results in your write-up. Explain any difficulties. Feel free to search for visual basic tutorials on the web.

Part 1) Programming in Visual Basic. VB is another programming language that runs on PC's running windows (mostly). Rather than typing in all the commands, some modules can be created with 'drag and drop', which saves time sometimes. It has variables, operators, and loops, (like Matlab) but the syntax differs. Variables should be declared – i.e. you must tell the computer what kind of variable: integer, floating point, or string (letters). The operators include =, +, -, *, ^, >, < and / as in Matlab. A loop is created with (slightly different from Matlab):

```
For counter=1 to 10  
    display.Text=counter
```

Next

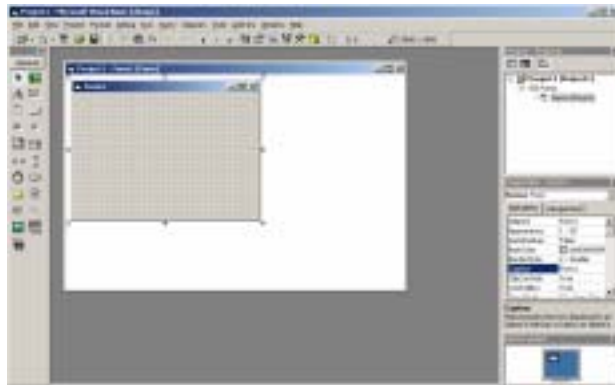
The new thing here is the *display.Text* variable. Visual Basic has a special type of variable called an object. An object can have attributes associated with it, each of which is a variable. Now start Visual Basic, and click on the Standard exe icon. You should see something like this (below) Now double-click on the Form1 box and you should see another box labeled "Project1 – Form (code)" with the words in it

```
Private Sub Form_Load()
```

```
End Sub
```

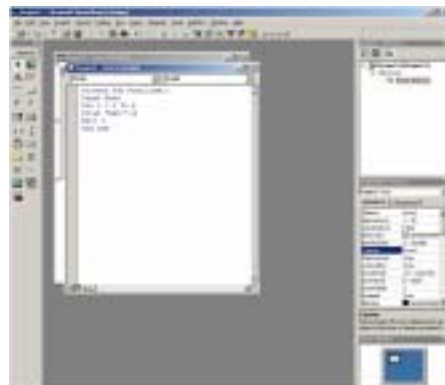
Now type in the following words in the lines between *Private* and *End Sub*.

```
Form1.Show  
For I=1 To 5  
Print "Beh!",i  
Next i
```



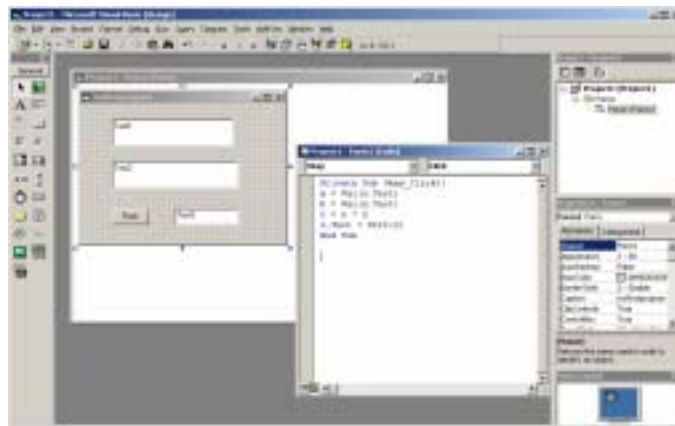
It should look like this =>

Now click on run, compile and you should get this:



Congratulations! You have made your first Visual Basic program. Hopefully. Now, if you click run, end it should bring you back to the code box. At the right you should see Properties – Form 1. In the line labeled Caption, change Form1 to myfirstprogram. This should change the name of the box. These are the attributes of the form box. On the left side you should see a set of icons (little cactus, mountain, white box with letters). Moving the mouse over them without clicking should show the names. Click on the “Textbox” and then draw a rectangle on the form box. A white box with Text1 should appear. This is a way to type information into the program. Now draw two more white boxes and a CommandButton. After highlighting each one by clicking on it, change the name of the first one to “x”, the next box to “y”, the third box to “z” and the Command Button to “Okay” – do not type in quotation marks. Now we want to make the program do something when we click on the command button, so double-click on the command button and put the following text in (some of it will already be there):

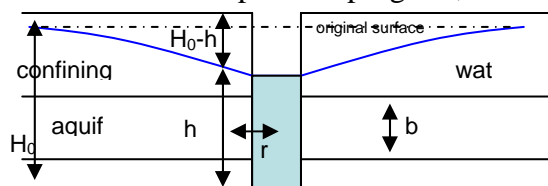
```
Private Sub Okay_Click()
a = Val(x.Text)
b = Val(y.Text)
c = x * y
z.Text = Str$(c)
End Sub
```



It should look like this: (I changed the caption of the button to push). If you compile and then put numbers in the top text boxes and hit the button, it should calculate the answer in the third button. The main thing here is that each object (text box or button) has a name (here we call it x, y or z). The code must correspond with the name of the object. Here we set $a = Val(x.Text)$ It takes the value of the number types in the text box named x and puts it in the variable a. If we renamed text box from “x” to say, “fred” we would have to change the code to $a = Val(fred.Text)$

Now that we know the basics, we can make a more complicated program, like for the Theis equation.

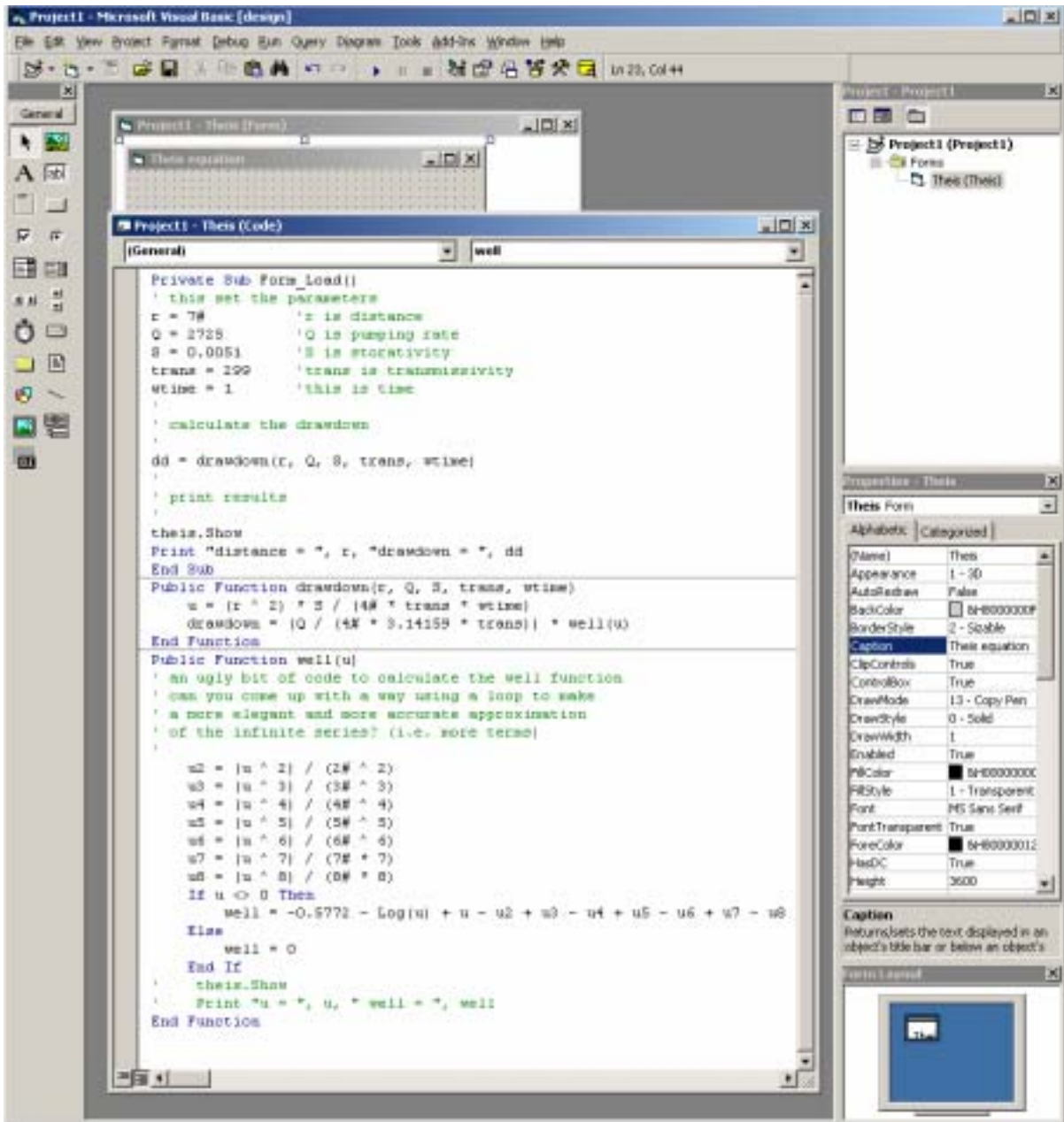
- Q pumping rate
- H hydraulic head
- H0 initial hydraulic head
- H0-h drawdown
- T aquifer transmissivity
- t time since pumping began
- r radial distance from well
- S aquifer storativity



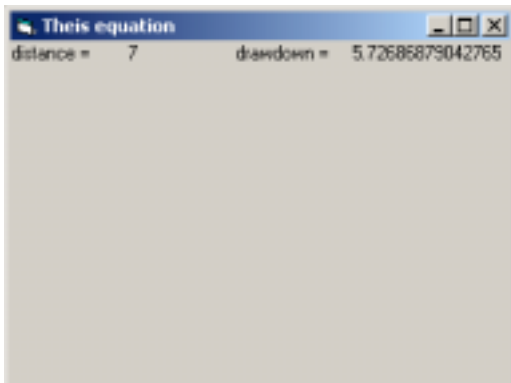
$$H_0 - h = (Q / r p T) W(u)$$

$$U = (r^2 S) / (4 T t)$$

$$W(u) = -0.5772 - \ln(u) + u - u^2/2 * 2 + u^3/3 * 3 - u^4/4 * 4 \dots$$

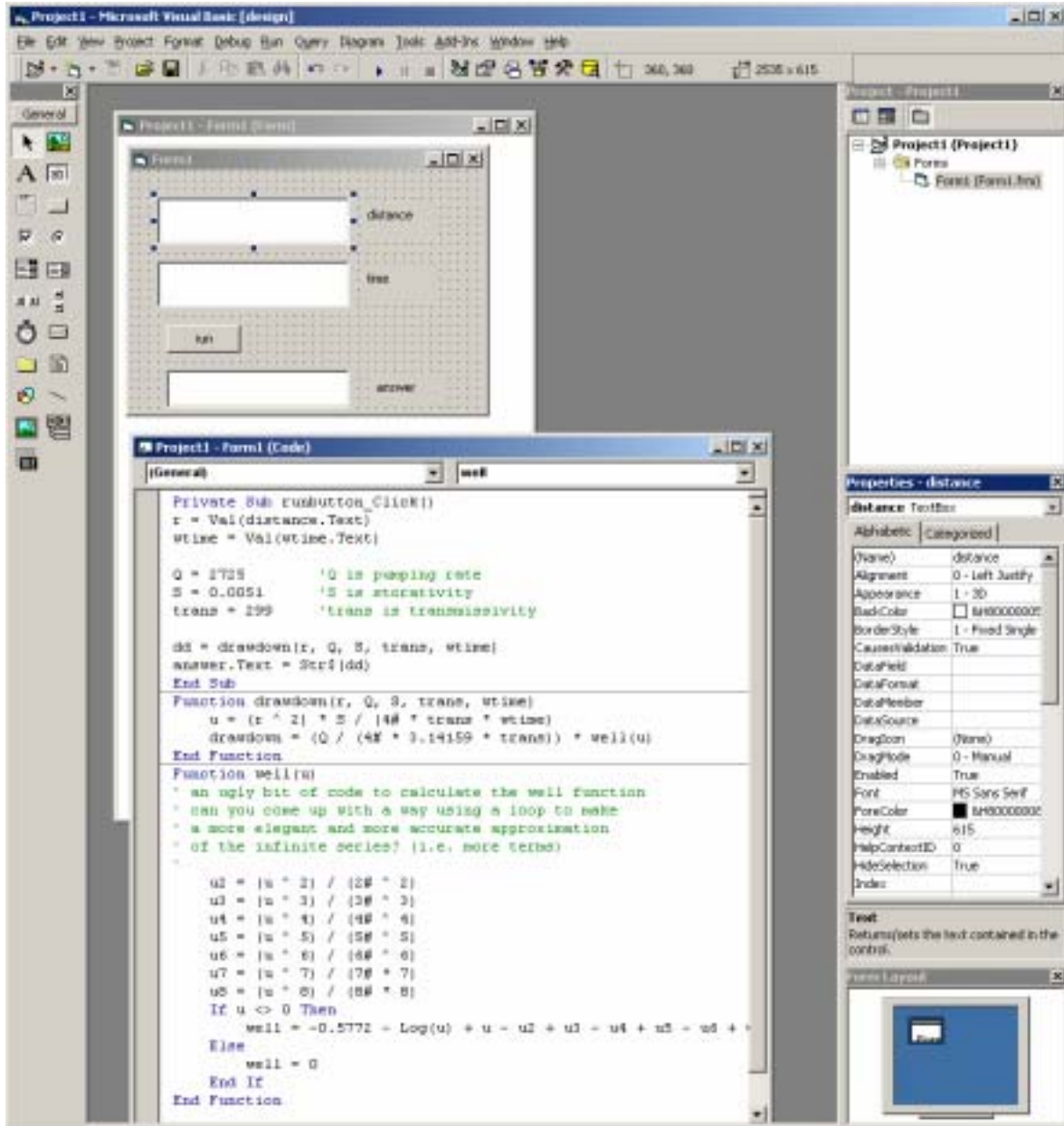


Here is my implementation



A) Copy this code into visual basic, compile, and run. Show results in your writeup and save executable as this1.exe (under file).

B) Now make a version where it accepts input from the outside.



Put a copy of the code/window in your writeup and save as theis2.exe.

C) Now we want to allow it to accept storativity and pumping rate as well. Create a version of the program that accepts all four inputs. Show results and save as theis3.exe.

D) Finally, see if you can modify the code in the well function to calculate 100 terms but do so in less lines of code. Can you use a loop?

E) Extra credit

Put a picture of yourself (or something else) on the program. Can you make something happen when you click on the picture?

