

GIS and Programming with Visual Basic

Example: Trend Surface
Analysis of a Subsurface
Petroleum Reservoir

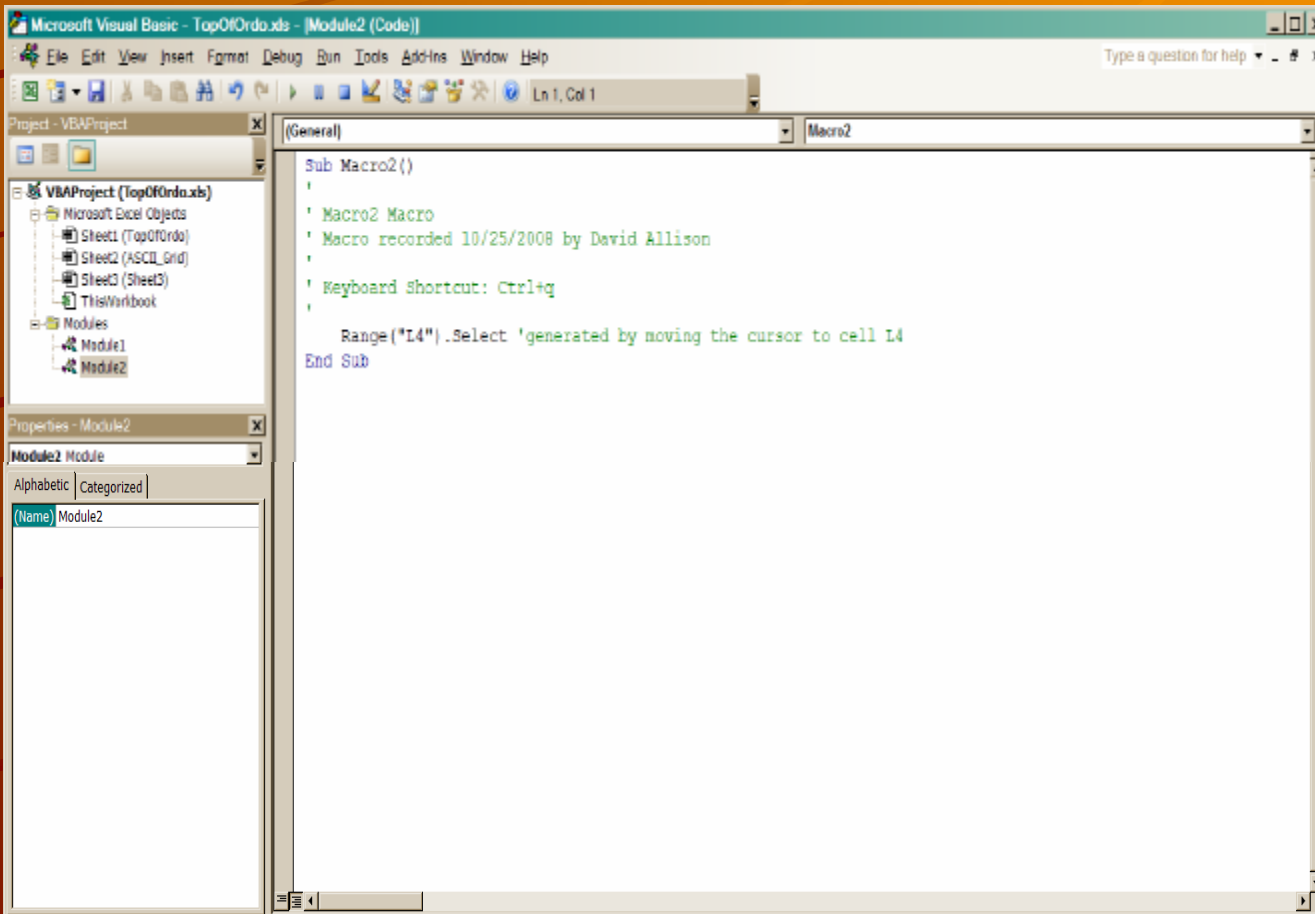


Visual Basic Editor

- ◆ Editor is invoked by creating a "macro" from within Excel
- ◆ "Tools" > "Macro" > "Record New Macro"
- ◆ Simply move the cursor to generate code and then stop recording
- ◆ Use "Tools" > "Macro" > "Visual Basic Editor" to enter VB editor

Example of Visual Basic Editor

✦ Note that “ctrl+q” activates the macro



Visual Basic Concepts

◆ Constants: literal values

- Integer: 2
- Single, Double precision: 3.1416
- String: "Trend Surface"

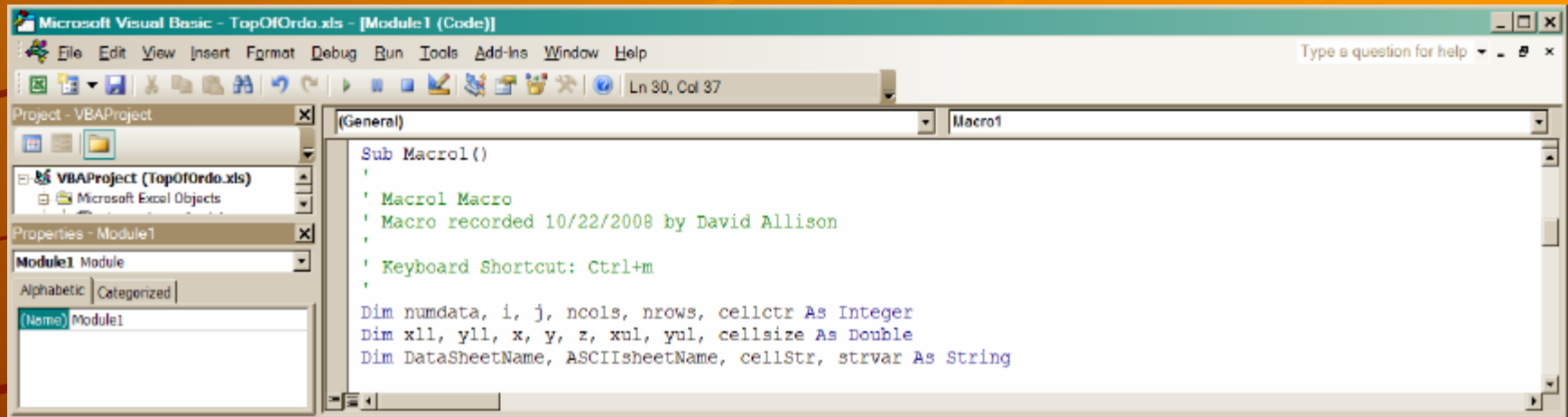
◆ Variables: a symbolic alphanumeric name that stores a value



Visual Basic Concepts: Declarations

- ◆ Declarations classify variables
 - Dim x, y, z as single
 - Dim strvar as string
 - Dim i, j as integer
- ◆ By convention variables that begin with i-n are declared as integer but that is not enforced by VB
- ◆ To avoid errors all variables used by a macro should be declared

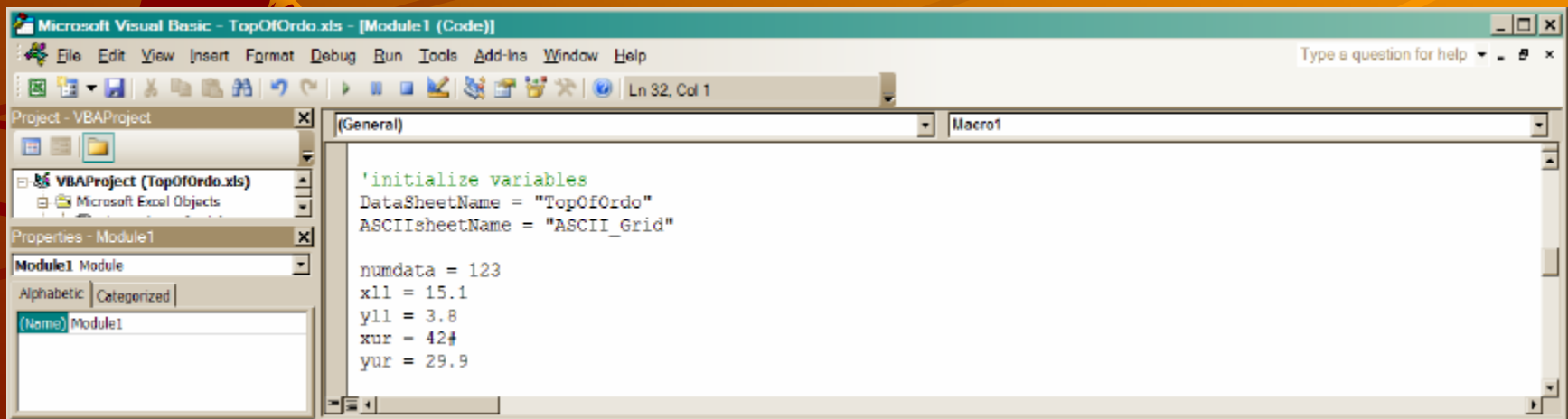
Visual Basic Declarations Example



- Integer, Double-precision and string variables are declared for use in the macro

Visual Basic: Assignment Statements

- Assignment statements are made with the "=" symbol. This stores the value to the right of the "=" into the variable to the left of the "=".



Visual Basic Operators

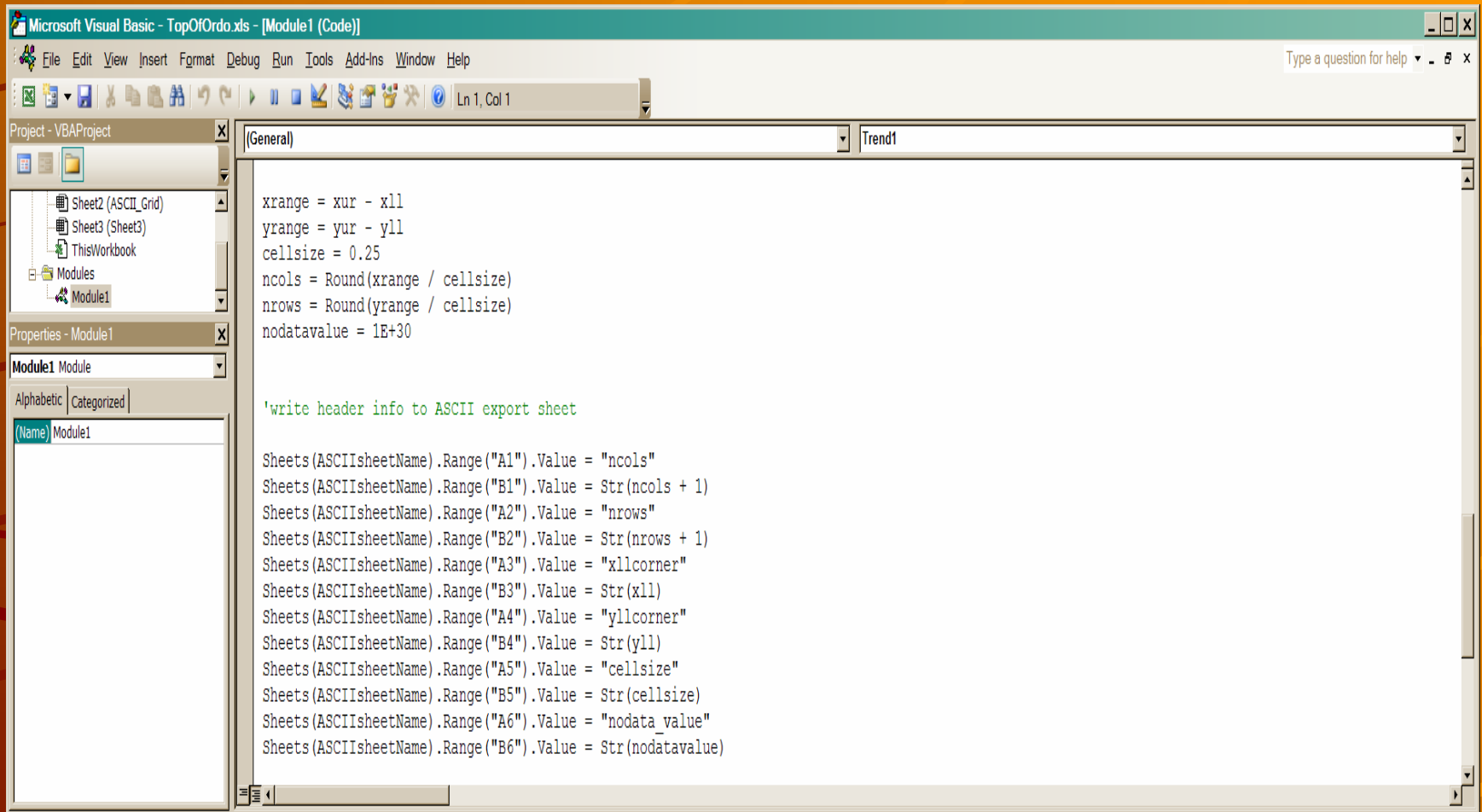
- ✦ Most operators are “numeric” – they operate on numbers to process calculations:

- “+” addition
- “-” subtraction
- “*” multiplication
- “/” division
- “^” or “**” exponentiation

- ✦ Examples:

- $xrange = xur - xll$
- $Area = x^2$

Application of Statements



The screenshot displays the Microsoft Visual Basic Editor window for the project 'TopOfOrdo.xls - [Module1 (Code)]'. The interface includes a menu bar (File, Edit, View, Insert, Format, Debug, Run, Tools, Add-Ins, Window, Help), a toolbar, and a status bar indicating 'Ln 1, Col 1'. The left-hand side contains three panes: 'Project - VBAProject' showing a tree view with 'Sheet2 (ASCII_Grid)', 'Sheet3 (Sheet3)', 'ThisWorkbook', and 'Modules' containing 'Module1'; 'Properties - Module1' showing 'Module1 Module'; and a list of module names with '(Name) Module1' selected. The main code area, titled '(General)' and 'Trend1', contains the following VBA code:

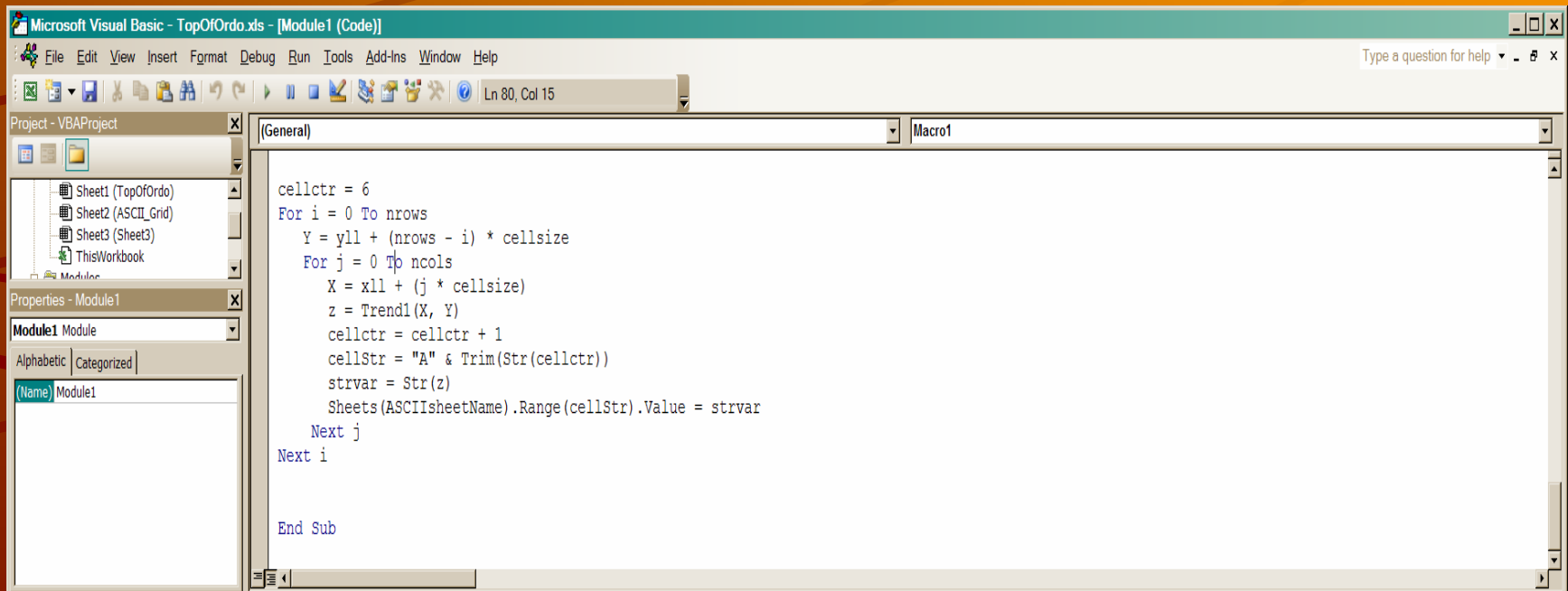
```
xrange = xur - xll
yrange = yur - yll
cellsize = 0.25
ncols = Round(xrange / cellsize)
nrows = Round(yrange / cellsize)
nodatavalue = 1E+30

'write header info to ASCII export sheet

Sheets(ASCIISheetName).Range("A1").Value = "ncols"
Sheets(ASCIISheetName).Range("B1").Value = Str(ncols + 1)
Sheets(ASCIISheetName).Range("A2").Value = "nrows"
Sheets(ASCIISheetName).Range("B2").Value = Str(nrows + 1)
Sheets(ASCIISheetName).Range("A3").Value = "xllcorner"
Sheets(ASCIISheetName).Range("B3").Value = Str(xll)
Sheets(ASCIISheetName).Range("A4").Value = "yllcorner"
Sheets(ASCIISheetName).Range("B4").Value = Str(yll)
Sheets(ASCIISheetName).Range("A5").Value = "cellsize"
Sheets(ASCIISheetName).Range("B5").Value = Str(cellsize)
Sheets(ASCIISheetName).Range("A6").Value = "nodata_value"
Sheets(ASCIISheetName).Range("B6").Value = Str(nodatavalue)
```

Visual Basic Statements

- ◆ For loop: processes one or more statements for a set number of cycles



Visual Basic: User-defined Functions

- ◆ Many intrinsic functions exist in programming languages such as VB:
 - $X = \text{Cos}(y)$
- ◆ A function takes an argument and returns a calculated value such as the cosine of an angle
- ◆ User-defined (explicit) functions are written by the user:
 - $X = \text{MyFunc}(y)$
 - The function “MyFunc” must be written by the programmer (i.e. it is not part of standard VB)

Visual Basic: Functions



Programming Notes

- ✦ The example used in this presentation was for a 1st order trend surface- the assignment will use a 3rd order trend surface
- ✦ To start a VB macro program use the Ctrl+{key} that you assigned to the macro
- ✦ If you have errors the VB system will usually mark the line where the error occurred