

## Visual Basic Functions for Natural Resource Programming

By David R. Larsen

### Lesson 6

Objectives:

In this lesson we will learn:

- Learn to program a tree volume function.
- Learn to pass multiple variables to the function
- Learn some basic syntax.
- Learn to run the function we just made.

Please refer to the previous lessons for detail not described here.

### Tree volume function

**Composite Hardwood Volume Equations**, By T. W. Beers, (October, 1964), Excel formulas by David R. Larsen

These volume equations have been useful for student inventory projects in Missouri. The equations are implemented with Excel examples for ease of use.

Three base equations are needed.

$$a = \frac{D^2(D + 190)}{100,000}$$

$$b = \frac{1}{100} \left[ \frac{H(168 - H)}{64} + \frac{32}{H} \right]$$

$$c = 475 + \frac{3H^2}{128}$$

Volume in cords = a \* b

Volume in board feet (Int. ¼" rule) = a \* b \* c

A cord is assumed to contain fit into 128 cubic feet, but will have 79 feet of solid woods

Volume in cubic feet (excluding bark) = 76 \* a \* b

Volume in cubic feet (Including bark) = 92 \* a \* b

Excel formulas

## Natural Resource Biometrics

The following equation assume DBH is in cell A1 and merchantable height H is in cell B1

Formula a:

$$=((A1^2*(A1+190))/100000)$$

Formula b:

$$=(1/100)*(((B1*(168-B1))/64)+(32/B1))$$

Formula c:

$$=475+((3*B1^2)/128)$$

Let's calculate a tree volume in the spreadsheet, first we have a column of data:

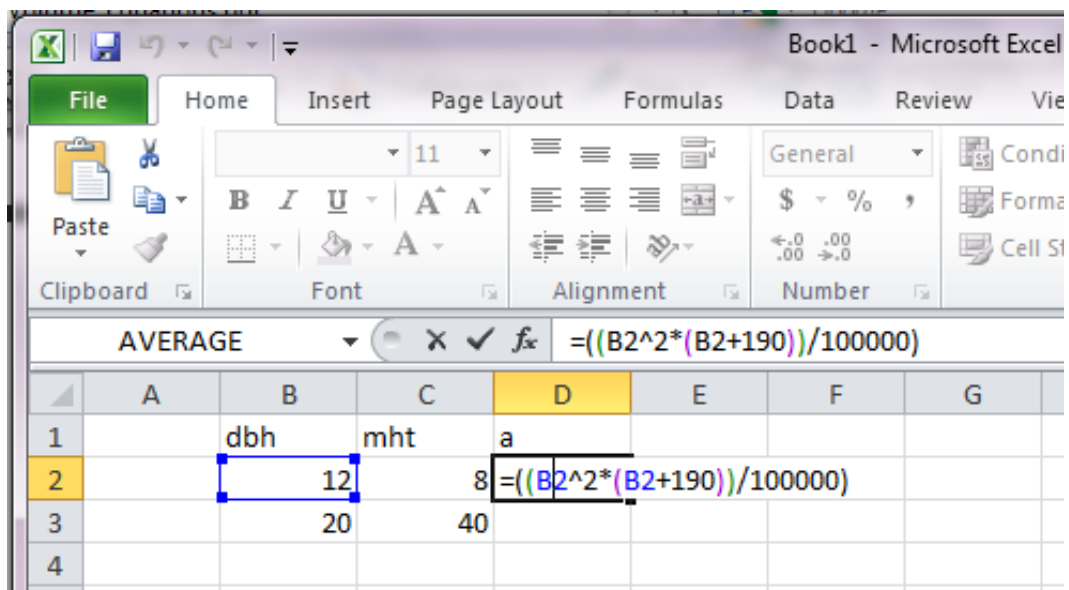


Figure 1. Entering the a equation into Excel.

# Natural Resource Biometrics

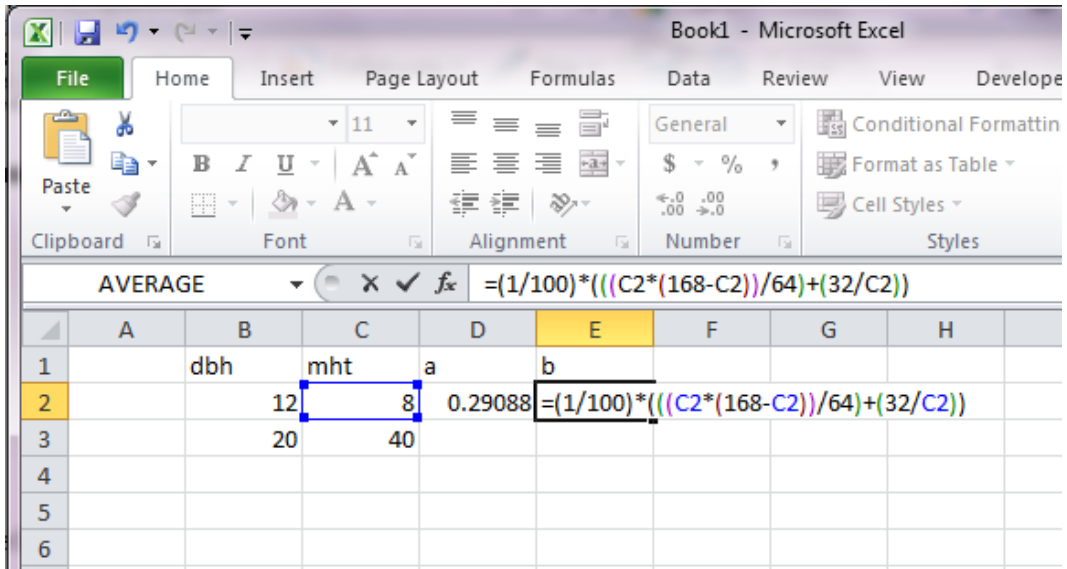


Figure 2 Entering the b equation into Excel

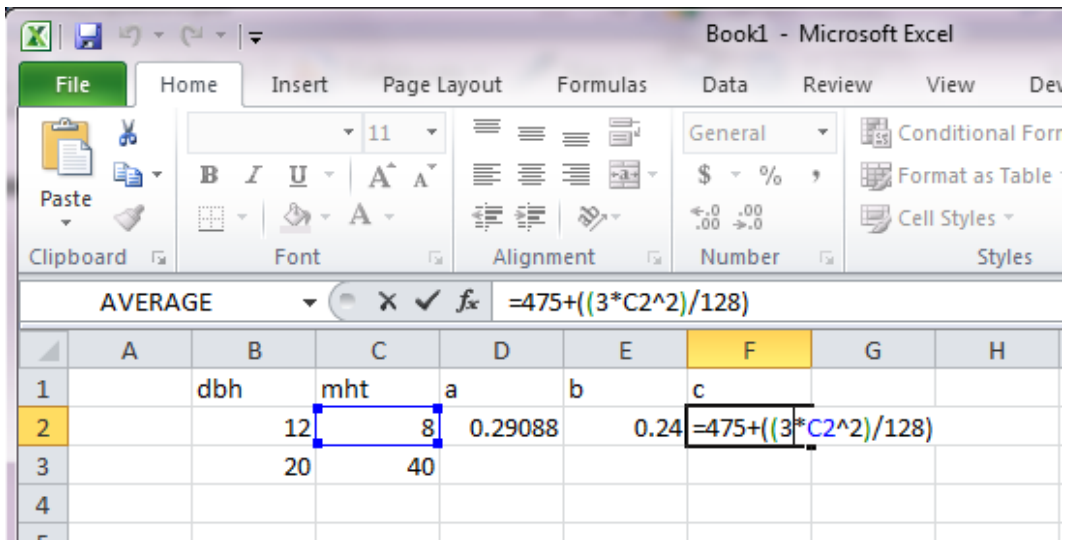


Figure 3. Entering the c equation into Excel.

# Natural Resource Biometrics

	A	B	C	D	E	F	G	H	I
1		dbh	mht	a	b	c			
2		12	8	0.29088	0.24	476.5	33.26504		
3		20	40	0.84	0.808	512.5	347.844		
4									
5									
6									

Figure 4. The result of the equation for Board foot volume.

## Programming the Function

I start with a volume function from lesson 2.

- Accept three variables of differing type as an argument returning a single number.
- Add appropriate comments.
- Calculate the a, b, and c equations
- Learn to use an if structure
- Learn to use a messagebox.
- Return the answer as a number of type Double.

During this these tutorials, I will give you short examples to help you learn the process. I will only give examples on items that are new please refer to previous lessons of steps already covered.

In a Module window type

```
Function volume(dbh As Single, mht As Single, vtype As String) As Double
```

This statement says a declare a function named volume with three input variables dbh, mht, and vtype and return a double precision variable. dbh is a single precision number, mht is a also a single precision number and vtype is a string variable the values "cords", "cubic", "cubicbark" and "boardfoot".

```
If (vtype = "cords") Then  
...  
ElseIf (vtype = "cubic") Then  
...  
Else
```

# Natural Resource Biometrics

...  
End If

this statement is an if structure it says the if the vtype variable equals the string "cords" then do the commands between this statement and the next command. You will need to add additional Elself commands to accomidate the other vtype values. The formulas to put where the "..." are can be found earlier in this document. The else statement is the one that is selected if vtype does not match any of the options you specified. We need to send a message to the user that the vtype did not match any of the known options. We do this with the following 2 commands.

```
volume = 0  
MsgBox (" vtype must be cords, cubic, cubicbark, or boardfoot")
```

We set volume to 0 because the function will return whatever is the variable volume. The second line a message to the user what values of vtype are acceptable.

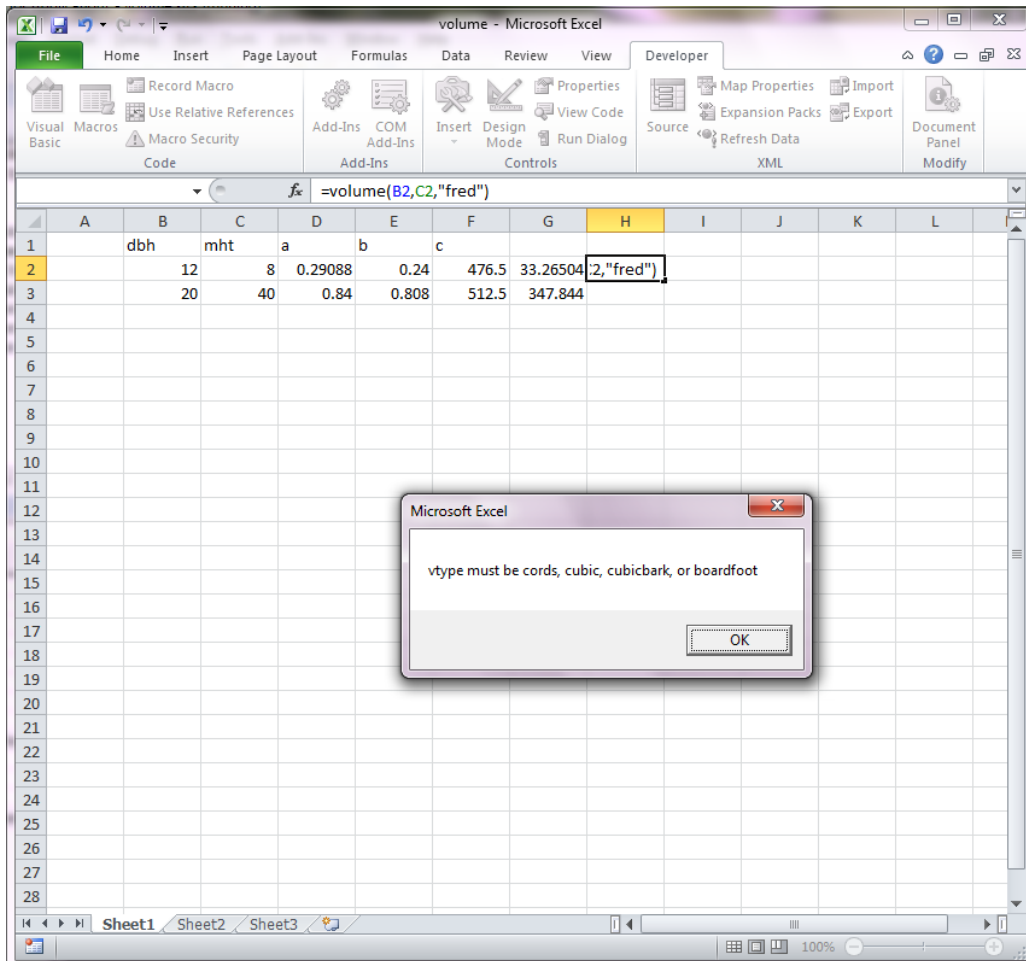


Figure 5. The result of using the messagebox command.

Now remember that the variable volume is returned to the spreadsheet. My actual working code needed only 15 lines of instructions.

# Natural Resource Biometrics

Now we will use the new volume function.

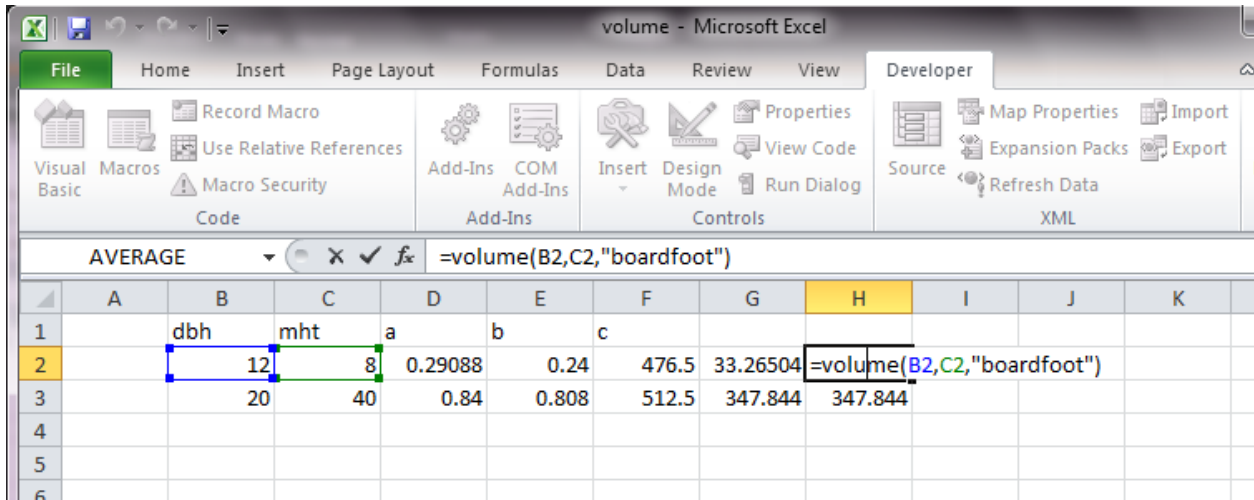


Figure 6. Using the volume function.

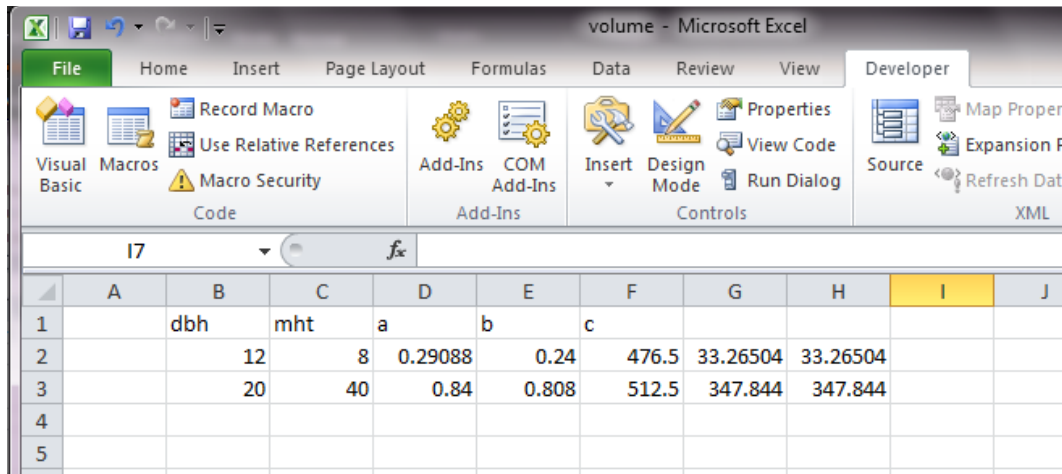


Figure 7. The result of the volume function.

In this lesson we have learn:

- Learn to program a tree volume function.
- Learn to pass multiple variables to the function
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- Learn to run the function we just made

Please write the volume function the works. Copy and paste the VBA commands into a document be sure your name is in the comments and send that to the Blackboard drop box.



### Reference

Beers, T. W. 1964 Composite Hardwood Volume Tables. Purdue University, Agricultural Experiment Station, Lafayette, IN. Research Bulletin 787. 12p.

