

## Visual Basic Functions for Natural Resource Programming

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### Lesson 5

Objectives:

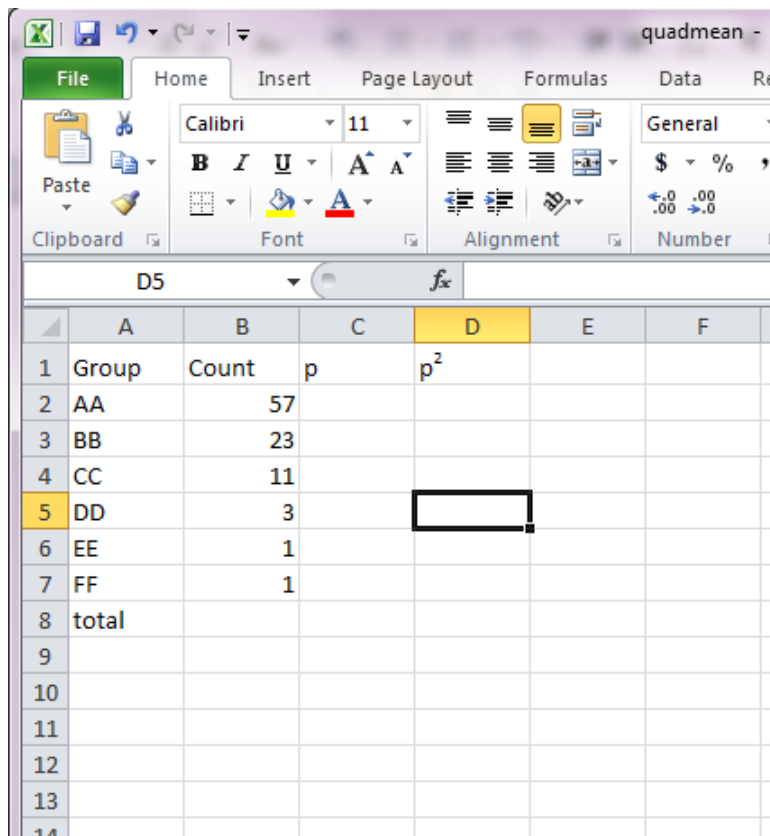
In this lesson we will learn:

- Learn to program a Shannon's index function.
- Learn some basic syntax.
- Learn to take log in different bases.
- Learn to use the absolute value function
- Learn to run the function we just made.

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

### Shannon's index of diversity function

Let's calculate a Shannon's index of diversity in the spreadsheet, first we have a column of data:



	A	B	C	D	E	F
1	Group	Count	p	p <sup>2</sup>		
2	AA	57				
3	BB	23				
4	CC	11				
5	DD	3				
6	EE	1				
7	FF	1				
8	total					
9						
10						
11						
12						
13						
14						

Figure 1, Count data entered in a spreadsheet

# Natural Resource Biometrics

Now we sum the count data.

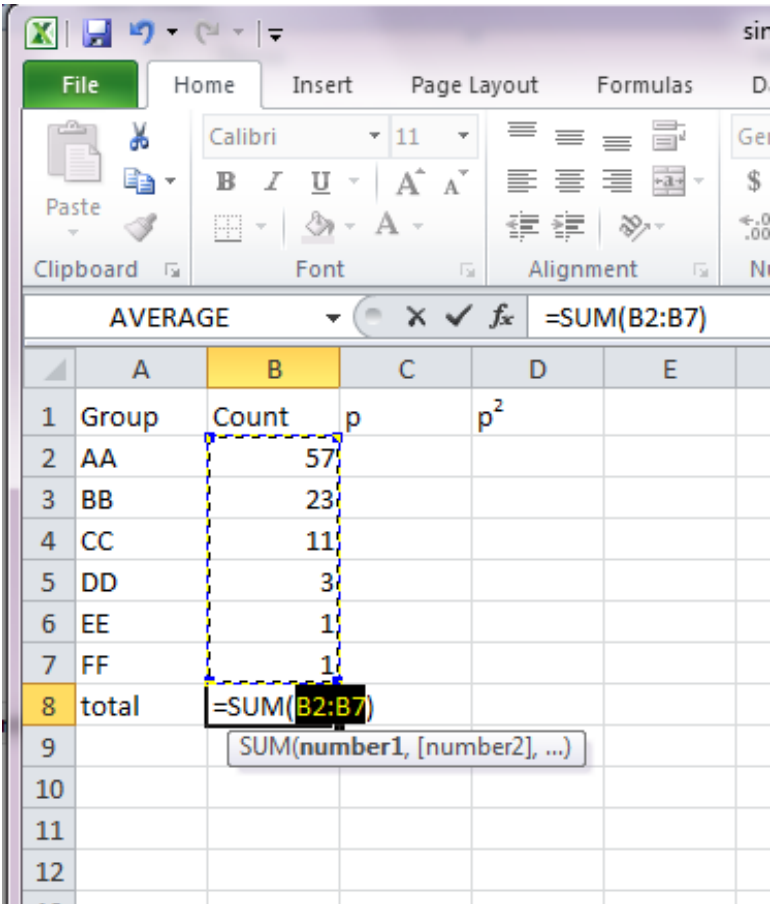
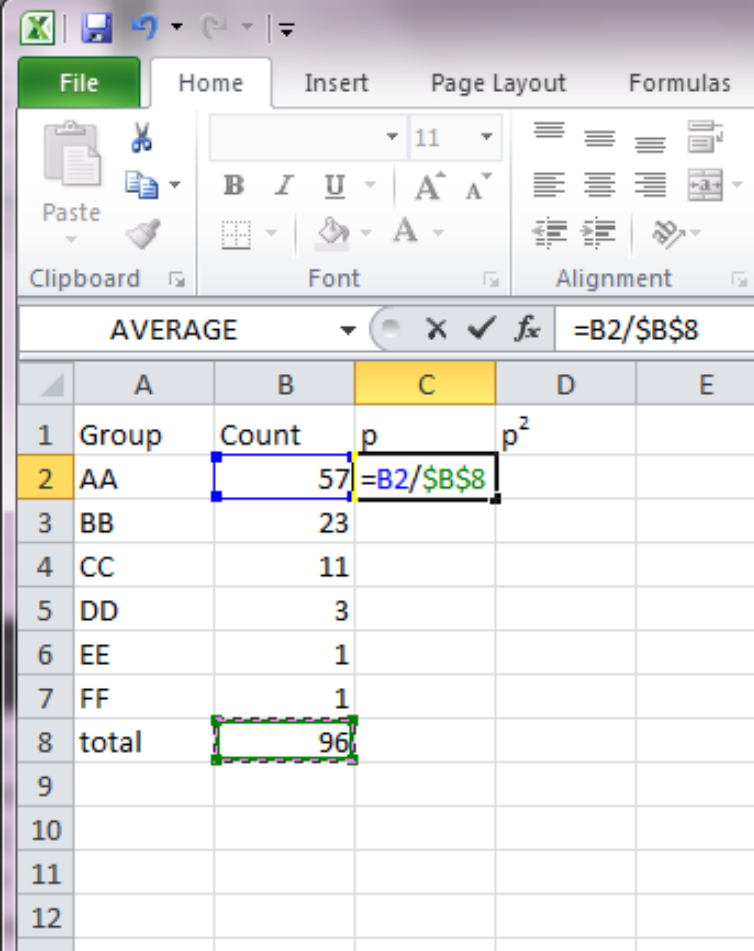


Figure 2. Sum the count data.



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Then we calculate the group proportions by dividing each count by the total



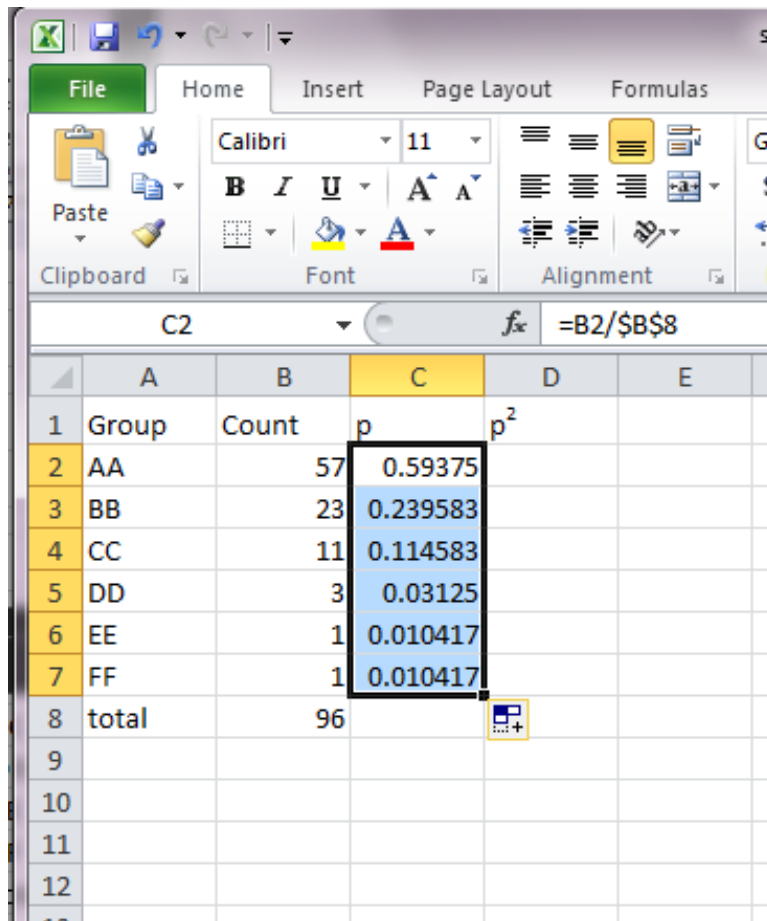
The screenshot shows the Microsoft Excel interface. The ribbon is set to 'Home', and the 'Font' and 'Alignment' groups are visible. The formula bar displays the formula  $=B2/\$B\$8$ . The spreadsheet data is as follows:

	A	B	C	D	E
1	Group	Count	p	$p^2$	
2	AA	57	$=B2/\$B\$8$		
3	BB	23			
4	CC	11			
5	DD	3			
6	EE	1			
7	FF	1			
8	total	96			
9					
10					
11					
12					
13					

Figure 3. Calculate the proportions for each group.

## Natural Resource Biometrics

This is a view of the calculated proportions.



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E
1	Group	Count	p	p <sup>2</sup>	
2	AA	57	0.59375		
3	BB	23	0.239583		
4	CC	11	0.114583		
5	DD	3	0.03125		
6	EE	1	0.010417		
7	FF	1	0.010417		
8	total	96			
9					
10					
11					
12					

The formula bar shows the formula  $=B2/\$B\$8$ .

Figure 4. The calculated proportions.

# Natural Resource Biometrics

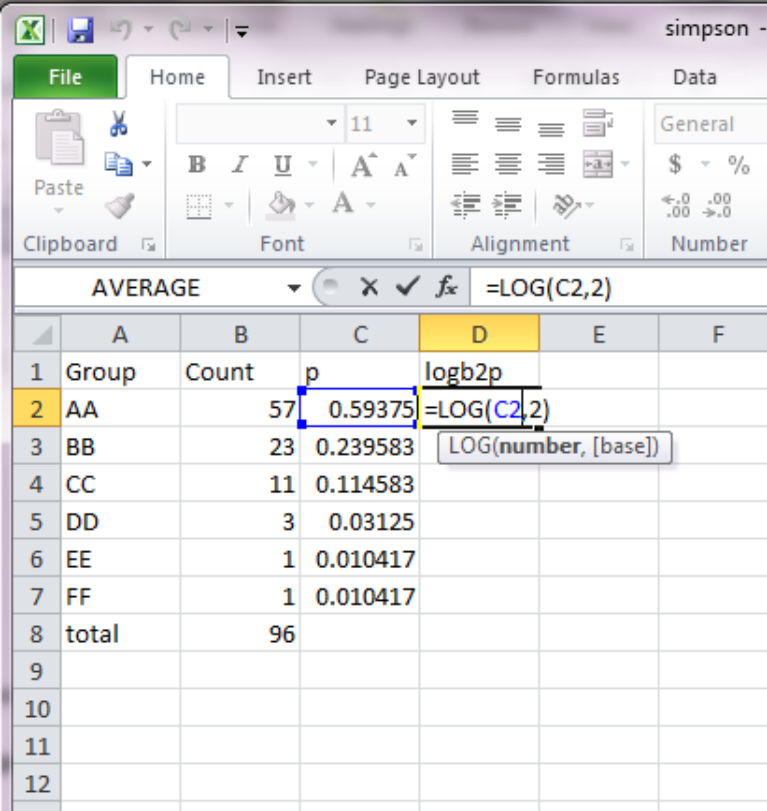


Figure 5 We now calculate the log of p to the base2



# Natural Resource Biometrics

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F
1	Group	Count	p	logb2p		
2	AA	57	0.59375	-0.75207		
3	BB	23	0.239583	-2.0614		
4	CC	11	0.114583	-3.12553		
5	DD	3	0.03125	-5		
6	EE	1	0.010417	-6.58496		
7	FF	1	0.010417	-6.58496		
8	total	96		=abs(SUM(D2:D7))		
9				SUM(number1, [number2], ...)		
10						
11						
12						

Figure 6. We now that the absolute value of the sum of this column.

# Natural Resource Biometrics

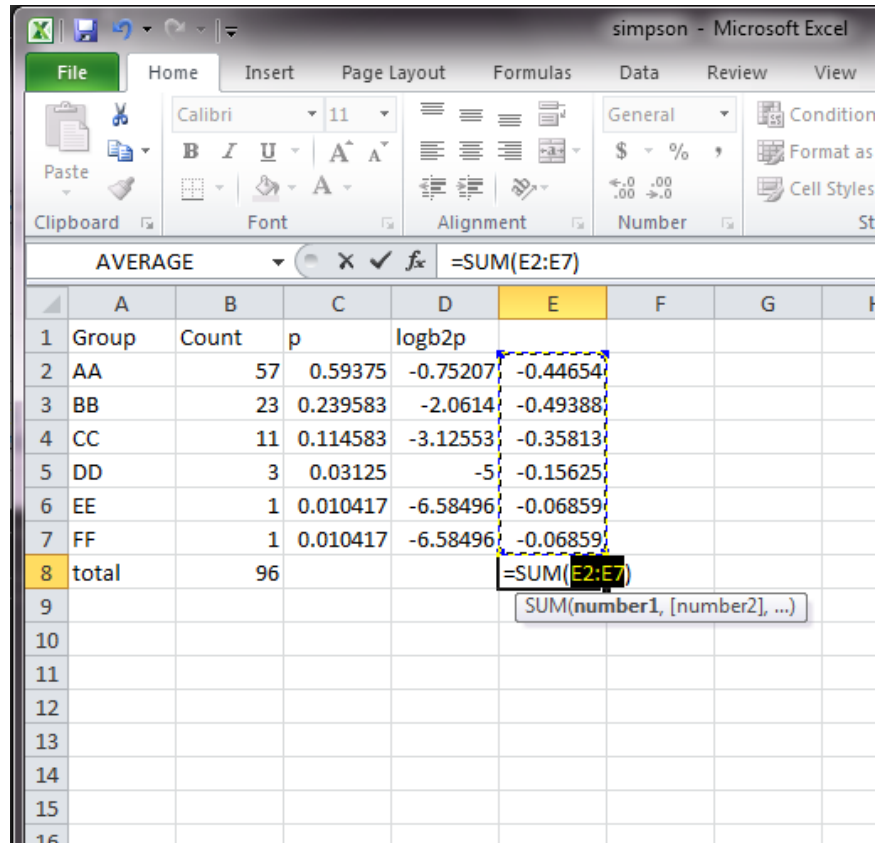


Figure 7

## Programming the Function

I start with a shannon function from lesson 4.

- Accept a range of numbers as an argument returning a double number. ( Note: the input data is count by category)
- Add appropriate comments.
- Determine the sum of the counts
- Divide each input number by the sum of the counts to get a proportion.
- Sum the squared proportions.
- Take the 1 - result.

## Natural Resource Biometrics

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- Return the answer as a number of type double.

During 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 shannon(data As Range) As Double
```

Please reuse your code from the mean example as the function is very similar.

In this function we need the total of the input counts. To do this we will need 2 [For Loops](#)

In the second [For loop](#), replace the mean statement with the following statement after the prop variable is calculated.

```
logprop = Math.Log(prop) / Math.Log(2)
```

this statement says a variable logprop equals the natural log of prop divided by the natural log of the number 2. This returns the natural log of x base 2 as described in the Shannon webpage. Also in the second [For loop](#) enter the following command.

```
sumprop = sumprop + (prop * logprop)
```

This statement says a variable sumprop equals the old value of sumprop + the prop value time the logprop value. Place the following statement outside the second [For loop](#).

```
shannon = Math.Abs(sumprop)
```

this statement says that the new value of shannon equals the absolute value of shannon , just as we did in the spreadsheet.

Now remember that the variable Shannon is returned to the spreadsheet. My actual working code need only 10 line of instructions.



# Natural Resource Biometrics

Now we will use the new shannon function.

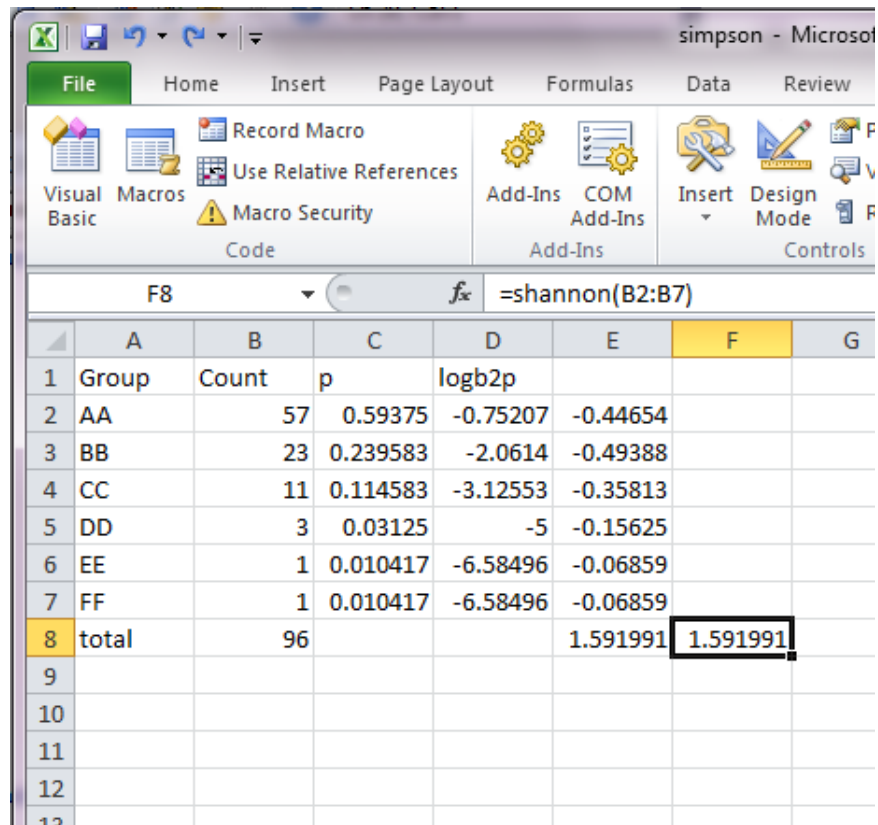


Figure 8

In this lesson we have learn:

- Learn to program a Shannon's index function.
- Learn some basic syntax.
- Learn to take log in different bases.
- Learn to use the absolute value function
- Learn to run the function we just made.

Please write the shannon 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.