

## Purpose

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The Point-biserial method of attaining a discrimination index can be daunting to those who are mathematically disinclined. I have written a VBA Macro for excel that does the heavy lifting for you. I urge you to know *how* the math works so you can understand what it means and how it is impacted by the different results in your data set. This formula will make the complicated math very simple so you can get on with the business of sussing out what it means.

## Installing

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This macro only works in Microsoft Excel, not OpenOffice or the other standard spreadsheet applications. To install it, follow these instructions.

### Copy the following text to your clipboard

```
'-----  
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' This function returns the item discrimination. It uses the point-  
biserial  
' formula. It accepts the item scores as a range (1 for correct, 0 for  
' incorrect), and the total test scores as a range. The item scores will  
' be the correct or incorrect responses for an item. The test scores will  
' be a region containing the final/total score corresponding to those same  
' students. The two ranges must have the same number of scores.  
'-----  
-----  
Function Discrim(item_scores As Range, test_scores As Range)  
    Dim intSumCorrect  
    Dim intNumCorrect  
    Dim intMeanCorrect  
    Dim intNumIncorrect  
    Dim intSumIncorrect  
    Dim intMeanIncorrect  
    Dim intNumItems  
    Dim sngStdDevP  
  
    'get the mean of scores for those who got it correct  
    intNumCorrect = Application.WorksheetFunction.CountIf(item_scores, 1)  
    intSumCorrect = Application.WorksheetFunction.SumIf(item_scores, 1,  
test_scores)  
    'Watch for 0 correct: it makes a "divide by 0 error"  
    If intNumCorrect = 0 Then  
        intMeanCorrect = 0  
    Else  
        intMeanCorrect = intSumCorrect / intNumCorrect  
    End If
```

```

'get the mean of scores for those who got it incorrect
intNumIncorrect = Application.WorksheetFunction.CountIf(item_scores, 0)
intSumIncorrect = Application.WorksheetFunction.SumIf(item_scores, 0,
test_scores)
'Watch for 0 correct: it makes a "divide by 0 error"
If intNumIncorrect = 0 Then
    intMeanIncorrect = 0
Else
    intMeanIncorrect = intSumIncorrect / intNumIncorrect
End If

'Find the Standard Deviation of the Population
sngStdDevP = Application.WorksheetFunction.StDevP(test_scores)

'Get the number of Items
intNumItems = Application.WorksheetFunction.Count(item_scores)

Discrim = ((intMeanCorrect - intMeanIncorrect) / sngStdDevP) *
Sqr((intNumCorrect * intNumIncorrect) / (intNumItems * (intNumItems - 1)))
End Function

```

**Open Excel on your computer.** This function will not be available on other computers unless you install it. If you are presenting on a school computer, just know that you will have to install this macro there too. (*On school computers: be aware that the macro will be lost when the machine reboots*)

**Hit [alt]+[F11]** to bring up the macro editor. There should be a tree on the left. The top item should be labeled "VBAProject" or something similar.

**Right Click on "VBAProject": Insert->Module:** The main screen should now be a blank white text area.

**Paste the code from your clipboard into the editor.** Once the text is pasted in, it should be green, blue, and black. This indicates the computer understands what the code is. If any of the text is **RED**, something is wrong. Try it again.

**Save the macro.** File->Save should do the trick. It may ask you to save-as. It should save the macro into your document.

## Usage

Once the macro is installed you can use it in your spreadsheet just like a regular function.

**In a cell, type:**

=Discrim(range of item scores, range of test scores)

The first argument, *range of item scores*, is the column of ones and zeroes for correct and incorrect answers to a question.

The second argument, *range of test scores*, is the column of total-test scores for the test. The number of test scores should be the same as the number of item scores.

See the following graphic for a visual representation of the formula:

	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG		
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Score			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	29			
1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	27			
1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	27			
1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	26			
1	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	26			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	26			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	26			
1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	26			
1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	26			
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1	26			
1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	26			
1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	25			
1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	25			
1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	25			
1	1	1	0	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	24			
1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24			
1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	24			
1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	23			
1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	23			
1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	23			
1	1	1	0	0	1	1	1	1	1	1	0	1	1	1	0	0	0	0	0	1	0	0	1	1	18			
0.00	1.00	1.00	0.67	0.95	0.76	0.86	0.95	0.67	0.95	1.00	0.52	0.95	0.90	0.86	0.62	0.81	0.90	0.76	0.95	0.90	0.38	0.95	0.81	0.86	25	5		
0	0	0	0.44	0.75	0.11	0.2	0.11	0.39	-0.1	0	0.37	-0.2	0.23	0.07	0.47	0.29	0.54	0.32	-0.1	0.62	0.33	-0.1	0.4068	=Discrim(AE2:AE22,AF2:AF22)				
																									mean	25		
																										median	26	
																											mode	26
																											range	11
																											KR20	0.39859914
																											Sem	1.65808959