



# Basic Data Analysis Using MS Excel

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#### First Things First: Toolpak

Click on "File" then on "Options"

#### Click on "Add Ins" then on "Manage ... Go"



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**UCONN** CAHNR EXTENSION





Click on the box, "Analysis Toolpak," and Then click on "OK"

You will see the "Data Analysis" option appear on the right-hand side of your ribbon.







#### **Overview**

Data Management
 Data Manipulation
 Data Analysis
 Data Communication





#### Preface

Relax and just listen Beginner pace Exposure to the Excel platform Exposure to T-Tests Tips & Tricks Support Materials





# **Data Manipulation**



Sort
 Filter
 Tip: Auto- or Flash-fill







	A		В	С	D		E		F	G	
1	State	Co	ounty	Age	Grade	Ge	ender	Ra	ace	4-H Hours	
2	СТ	Ha	artford	9	4		1		1	1	
3	СТ	Ha	artford	15	12		1		7	1	
4	СТ	Ha	artford	17	2		2		2	3	
5	СТ	Тс	lland	17	10		1		7	2	
6	СТ	Тс	lland	16	11		1		7	3	
7	СТ	Тс	lland	14	4		1		3	6	
8	СТ	Тс	lland	11	8		2		2	6	
9	СТ	Ne	ew London	6	12		2		3	1	
10	ст	Ne	ew London	10	9		2		1	3	
11	СТ	Ne	ew London	17	8		2		5	5	
12	СТ	Ne	ew London	15	3		2		6	6	
13	СТ	Lit	tchfield	15	6		2		4	4	
14	СТ	Li	tchfield	14	8		2		2	2	
15	ст	Li	tchnold	14	6		2		1	5	
16	СТ	4	A	В	С		D		E	F	G
17	СТ	1	State	County	Age		Grade		Gender	Race	4-H Hours
18	СТ	2	СТ	Hartford		9		4		1 1	L
19	СТ	3	СТ	Hartford		15		12		1 7	7
20	СТ	4	СТ	Hartford		17		2		2 2	2
21	СТ	5	СТ	Tolland		17		10		1 7	7
22	СТ	6	СТ	Tolland		16		11		1 7	7
23	СТ	7	СТ	Tolland		14		4		1 3	3
24	СТ	8	СТ	Tolland		11		8		2 2	2
25	CI	9	СТ	New Londo	on	6		12		2 3	3
26	CI I	10	СТ	New Londo	on	10		9		2 1	L
	1	1	СТ	New Londo	on	17		8		2 5	5
	1	12	СТ	New Londo	on	15		3		2 6	5
	1	13	СТ	Litchfield		15		6		2 4	1
	1	٤4	СТ	Litchfield		14		8		2 2	2
	1	15	СТ	Litchfield		14		6		2 1	L
	1	16	СТ	Litchfield		10		7		1 2	2
	1	17	СТ	Fairfield		12		2		2 7	7
	1	18	СТ	Fairfield		9		10		2 4	1
	1	۱9	СТ	Fairfield		5		3		1 3	3
	2	20	СТ	Fairfield		10		7		1 5	5
		21	СТ	Windham		11		10		1 6	5
		22	CT	Windham		16		6		1 5	5
		23	Cr 	Windham		12		2		1 3	3
	,	24	CT	Middlesex		9		6		2 2	2
		25	CI	Middlesex		13		5		1 5	
		26	CI	Middlesex		12		11		2 3	5

#### Select the data in my spreadsheet. Go to "Data" tab. Select "Sort."



# I'm going to sort by Column B (county) in alphabetical order.

Sort	2	A					?	×
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#### Sorted by Column A alphabetically

	2								
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Column			Sort On			Order			
Sort by	Column B	$\sim$	Cell Values		$\sim$	A to Z			~
							OK	C	ancel
	1	3	_			_			

	А	В	С	D	E	F	G
1	State	County	Age	Grade	Gender	Race	4-H Hours
2	СТ	Fairfield	12	2	2	7	2
3	СТ	Fairfield	9	10	2	4	2
4	СТ	Fairfield	5	3	1	3	4
5	СТ	Fairfield	10	7	1	5	5
6	СТ	Hartford	9	4	1	1	1
7	СТ	Hartford	15	12	1	7	1
8	СТ	Hartford	17	2	2	2	3
9	СТ	Litchfield	15	6	2	4	4
10	СТ	Litchfield	14	8	2	2	2
11	СТ	Litchfield	14	6	2	1	5
12	СТ	Litchfield	10	7	1	2	6
13	СТ	Middlesex	9	6	2	2	2
14	СТ	Middlesex	13	5	1	5	3
15	СТ	Middlesex	12	11	2	3	1
16	СТ	New London	6	12	2	3	1
17	СТ	New London	10	9	2	1	3
18	СТ	New London	17	8	2	5	5
19	СТ	New London	15	3	2	6	6
20	СТ	Tolland	17	10	1	7	2
21	СТ	Tolland	16	11	1	7	3
22	СТ	Tolland	14	4	1	3	6
23	CT	Tolland	11	8	2	2	6
24	СТ	Windham	11	10	1	6	3
25	СТ	Windham	16	6	1	5	6
26	СТ	Windham	12	2	1	3	3

#### Sorted by Column B alphabetically and then by Colum C smallest to largest

+ <u>A</u> dd	Level X Delete Lev	el E <u>C</u> opy Level 2	∑ <u>O</u> ptions	My data ha	s <u>h</u> eade
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hen by	Column C	<ul> <li>Cell Values</li> </ul>	Smalles	t to Largest	~

	А	В	С	D	Е	F	G
1	State	County	Age	Grade	Gender	Race	4-H Hours
2	СТ	Fairfield	5	3	1	3	4
3	СТ	Fairfield	9	10	2	4	2
4	СТ	Fairfield	10	7	1	5	5
5	СТ	Fairfield	12	2	2	7	2
6	СТ	Hartford	9	4	1	1	1
7	СТ	Hartford	15	12	1	7	1
8	СТ	Hartford	17	2	2	2	3
9	СТ	Litchfield	10	7	1	2	6
10	СТ	Litchfield	14	8	2	2	2
11	СТ	Litchfield	14	6	2	1	5
12	СТ	Litchfield	15	6	2	4	4
13	СТ	Middlesex	9	6	2	2	2
14	СТ	Middlesex	12	11	2	3	1
15	СТ	Middlesex	13	5	1	5	3
16	СТ	New London	6	12	2	3	1
17	СТ	New London	10	9	2	1	3
18	СТ	New London	15	3	2	6	6
19	СТ	New London	17	8	2	5	5
20	СТ	Tolland	11	8	2	2	6
21	СТ	Tolland	14	4	1	3	6
22	СТ	Tolland	16	11	1	7	3
23	СТ	Tolland	17	10	1	7	2
24	СТ	Windham	11	10	1	6	3
25	СТ	Windham	12	2	1	3	3
26	СТ	Windham	16	6	1	5	6

#### UCONN

**CAHNR EXTENSION** 

	А	В	С	D	E	F	G			
1	State	County	Age	Grade	Gender	Race	4-H Hours			
2	СТ	Fairfield	5	3	1	3	4			
3	СТ	Fairfield	9	10	2	4	2			
4	СТ	Fairfield	10	7	1	5	5			
5	СТ	Fairfield	12							
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1	СТ	Litchfield	14.		: ×	fr Cou	ntv	$\sim$		
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.6	ст	New London	¢,	ст	Fairfield	9	10	2	4	2
.7	ст	New London	14	СТ	Fairfield	10	7	1	5	5
.8	ст	New London	15	ст	Fairfield	12	2	2	7	2
.9	ст	New London	1;	СТ	Hartford	9	4	1	1	1
20	ст	Tolland	17	СТ	Hartford	15	12	1	7	1
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2	ст	Tolland	10	СТ	Litchfield	10	7	1	2	6
23	ст	Tolland	10	ст	Litchfield	14	8	2	2	2
24	ст	Windham	11	СТ	Litchfield	14	6	2	1	5
!5	ст	Windham	12	ст	Litchfield	15	6	2	4	4
26	ст	Windham	18	СТ	Middlesex	9	6	2	2	2
-			4	ст	Middlesex	12	11	2	3	1
			5	СТ	Middlesex	13	5	1	5	3
			6	ст	New London	6	12	2	3	1
			7	СТ	New London	10	9	2	1	3
			8	СТ	New London	15	3	2	6	6
			9	СТ	New London	17	8	2	5	5
			0	СТ	Tolland	11	. 8	2	2	6
			1	СТ	Tolland	14	4	1	3	6 State
			2	СТ	Tolland	16	11	1	7	3 CT
			3	СТ	Tolland	17	10	1	7	2 CT
			4	СТ	Windham	11	. 10	1	6	3
			5	СТ	Windham	12	2	1	3	3
			6	СТ	Windham	16	6	1	5	6
			-							



Sort & **Filter** 

	А	В	С			
1	State	County 💌	Age	[		
₽↓	Sort A to Z					
Z↓	Sort Z to A					
	Sor <u>t</u> by Color		•	1		
X	<u>C</u> lear Filter Fron	n "County"		1		
	Filter by Color		Þ	1		
	Text <u>F</u> ilters		۱.	1		
	Search		Q	1		
	Velect A Fairfield Velation Velation Velation Vew Lon Vew Lon Vew Lon Vew Lon Vew Lon Veland Velanks	ll) x don				
		OK	Cancel .:	1		
21	СТ	Tolland		1		
/	$\frown$					
c	County 🖵 Ag	💌 Grad	e 🔽 Ge	nder 💌	Race 🔻	4-H Hours 💌
н	lartford	9	4	1	1	1
Н	lartford	15	12	1	7	1
н	lartford	17	2	2	2	3





#### Auto or Flash Fill: Can fill in the same value or formula or a sequence

	А	В	С	D
258	MA26115	Mt. Airy	2015	0
259	MA26215	Mt. Airy	2015	0
260	MA26315	Mt. Airy	2015	0
261	MA26415	Mt. Airy	2015	0
262	MA26515	Mt. Airy	2015	0
263	MA26615	Mt. Airy	2015	0
264	MA26715	Mt. Airy	2015	0
265	MA26815	Mt. Airy	2015	0
266	MA26915	Mt. Airy	2015	0
267	MA27017	Mt. Airy	2015	0
'				

# Grab the handle at the bottom right corner. Hold and drag

90	IVIA26915	IVIT. AIRY
57	MA27015	Mt. Airy
58	MA27016	
<u>5</u> 9	MA27017	
0	MA27018	
71	MA27019	
2	MA27020	
72		

266	MA26915	Mt. Airy
267	MA27015	Mt. Airy
268	MA27016	Mt. Airy
269	MA27017	Mt. Airy
270	MA27018	Mt. Airy
271	MA27019	Mt. Airy
272	MA27020	Mt. Airy

There is also a "Fill" option on the Home Menu Ribbon where you can set up multiple fill options.

Series in	Туре	Date unit		
Rows	<u>Linear</u>	Day     Day		
© <u>C</u> olumns	Growth	Weekday		
	Date	Month		
	Auto <u>F</u> ill	Year		
Trend Step value:				













#### Multiple ways to go about your analysis.







## **Descriptive Stats Using Toolpak**

	Α	В	С	D	E	F	G
2	Hartford	15	9	1	2	2	2
3	Hartford	9	(		-	(	2 2
4	Hartford	9	Descriptive	statistics		(	
5	Hartford	15	Input				ОК
5	Hartford	17	Input Ran	ge:	SBS2:SBS151		Cancel
7	Hartford	15	Grouped B	By:	Olumns		cancer
В	Hartford	17			© <u>R</u> ows		<u>H</u> elp
9	Hartford	5	Labels	in first row			
0.	Hartford	5	Output op	tions			
.1	Hartford	7	Output	t Range:	\$J\$154	1	
.2	Hartford	14	New W	/orksheet Plv:			
.3	Hartford	13	O New W	/orkbook			
.4	Hartford	12					
.5	Hartford	11	Confid	any statistics	95	%	
.6	Hartford	14	Vth Lor	ence Level for Me	1		
.7	Hartford	5	Vth Cm	gest	1		
8.	Hartford	6	Kui S <u>m</u>	anesti			
.9	Hartford	16					
0	Hartford	6	9	2	1	3	3

1	5
	44 500504
Mean	11.590604
Standard Env	0.32041792
Median	12
Mode	14
Standard Dev	<del>3.911</del> 19914
Sample Varia	15.2974787
Kurtosis	-1.1611581
Skewness	0.1057812
Range	13
Minimum	5
Maximum	18
Sum	1727
Count	149
Confidence L	0.63318506

N=149





#### Example: Typing in a Formula

File Home		Insert	Page Layout	Formulas	Data
j	$f_x \sum$		? A		<u>م</u> ا
un	ction -	Used • •	cial Logical Tex	t Date & Looi Time ▼ Refer	cup oc iviat rence ≠ Trie
			Function Libr	arv	
				,	
SU	M	: × 🗸	<i>f</i> <sub>≈</sub> =AVE	RAGE(C2:C26)	
	А	В	С	D	E
1	State	County	Age	Grade	Gender
2	СТ	Fairfield	5	3	
3	СТ	Fairfield	9	10	
4	СТ	Fairfield	10	7	
5	СТ	Fairfield	12	2	
6	СТ	Hartford	9	4	
7	СТ	Hartford	15	12	
8	СТ	Hartford	17	2	
9	СТ	Litchfield	10	7	
10	СТ	Litchfield	14	8	
1	СТ	Litchfield	14	6	
12	СТ	Litchfield	15	6	
13	СТ	Middlesex	9	6	
4	СТ	Middlesex	12	11	
15	СТ	Middlesex	13	5	
16	СТ	New London	6	12	
.7	СТ	New London	10	9	
8	СТ	New London	15	3	
9	СТ	New London	17	8	
20	СТ	Tolland	11	8	
21	СТ	Tolland	14	4	
22	СТ	Tolland	16	11	
23	СТ	Tolland	17	10	
24	СТ	Windham	11	10	
25	СТ	Windham	12	2	
26	СТ	Windham	16	6	
27			=AVERAGE(C	2:C26	
28			AVERAGE(nur	nber1, [number	2],)
29					

=count(D2:D26								
с	D		E					
	Grade		Gender					
	5	3	1					
	9	10	2					
1	0	7	1					
1	2	2	2					
	9	4	1					
1	5	12	1					
1	7	2	2					
1	0	7	1					
1	4	8	2					
1	4	6	2					
1	5	6	2					
	9	6	2					
1	2	11	2					
1	3	5	1					
	6	12	2					
1	0	9	2					
1	5	3	2					
1	7	8	2					
1	1	8	2					
1	4	4	1					
1	6	11	1					
1	7	10	1					
1	1	10	1					
1	2	2	1					
1	6	6						
12.3	6 =count(	02:02	26 4 forebas21					
	COUNT	value	e I, [vaiue2],)					

=cou	ntif(E2:E26,"1'	')	
:	D	E	F
	Grade	Gender	Race
5	3	1	
9	10	2	
10	7	1	
12	2	2	
9	4	1	
15	12	1	
17	2	2	
10	7	1	
14	8	2	
14	6	2	
15	6	2	
9	6	2	
12	11	2	
13	5	1	
6	12	2	
10	9	2	
15	3	2	
17	8	2	
11	8	2	
14	4	1	
16	11	1	
17	10	1	
11	10	1	
12	2	1	
16	Û	i	
12.36	25	=countif(E2:E	26,"1")





#### Using Formulas from the Formula Tab

File	Home	Insert	e Pag	je Layou	t	Formula	as Data	Rev	view V	/iew
fx	Σ	☆		?	Α		Q	θ		
Insert	AutoSum	Recently	Financial	Logical	Text	Date &	Lookup &	Math &	More	
unction	*	Used 🔻	-	*	-	Time -	Reference *	Trig 👻	Functions	-
Function Library										

P-Val	ue	shows	as	.36
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1	# of Hours		
2	Boy	Girl	
3	2	2	0.364016
4	1	3	
5	1	5	

			4	3	🖭 Define Name 🔹	🚼 🖓 Tr
	L.	lore	Name		୍ରି TX Use in Formula ⊤	📲 Tr
17	Func	tions <b>*</b>	Ma	nager	🔓 Create from Selection	🄀 Re
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2			2		BETA.INV	
6			2		BINOM.DIST	
1			1		DINIONA DIST DANISS	





#### III. Data Analysis

# Infer (Inferential Statistics): Paired & Un-paired T-Tests P-Value (probability value)











### **Review Main Points**

- T-test looks for significant difference between two sets of data.
- Eliminates our bias.
- Science wants a 95% confidence level.
- T-test returns the p-value (probability).
- Want a p-value that is <.05</li>
- Because that says the difference in the data is NOT attributable to random chance.





#### **Review Main Points**

If the results are not attributable to chance, Then our program intervention worked.





#### Question

#### Is there a significant difference between girls and boys in the number of hours spent in 4-H activities each week?

**Open-ended**; therefore a two-tailed t-test





#### Question

# Do boys spend more time each week in 4-H activities than girls?

# Closed-ended; one direction; therefore a one-tailed t-test





### **Paired or Unpaired Data**

1	Student ID	Gender	Hours
2	CT1	1	2
3	CT2	2	2
4	СТЗ	1	1
5	CT4	1	1
6	СТ5	2	3
7	СТб	1	4
8	СТ7	2	5
9	СТ8	2	2
0.	СТ9	1	3
.1	СТ10	1	5
2	CT11	2	2
.3	CT12	1	6
.4	CT13	1	6
.5	CT14	2	1
.6	CT15	1	6
.7	CT16	2	1
.8	CT17	2	2
.9	CT18	1	1
20	CT19	2	3
1	CT20	2	4
2	CT21	2	2
23	СТ22	2	4
4	CT23	1	1
25	CT24	1	5
26	CT25	2	2
27	СТ26	2	3
8	СТ27	2	5
9	CT28	2	6

#### Paired





#### **Paired or Unpaired Data**

Average # of Hours Spent in 4-H Activites/Week							
Boys	Girls						
2	2						
1	3						
1	5						
4	2						
3	2						
5	1						
6	1						
6	2						
6	3						
1	4						
1	2						
5	4						
3.416667	2.583333						

Unpaired





### Let's go back to a question

Is there a significant difference between girls and boys in the number of hours spent in 4-H activities each week?

**Open-ended**; therefore a two-tailed t-test





#### Two-tailed T-Test on Unpaired Data Using Formula Bar

File	Home	Insert	t Pag	je Layou	t 🜔	Formula	as Data	Rev	view Vie	W
fx	Σ	☆		?	A		2		•••	
Insert	AutoSum	Recently	Financial	Logical	Text	Date &	Lookup &	Math &	More	
unction	*	Used 🔻	-	-	-	Time *	Reference *	Trig 🕶	Functions *	
Function Library										

	# of Hours		
	Воу	Girl	Function Arguments
	2	2	T.TEST
	1	3	Array1
	1	5	Array2
	4	2	Tails = number
1	3	2	
i.	5	1	Type = number
	6	1	=
D	6	2	Returns the probability associated with a Student's t-Test.
1	6	3	Array1 is the first data set.
2	1	4	
3	1	2	
1	5	4	Formula result =
5	3	2	Help on this function OK Cancel
5	2	3	
7	2	5	
		-	





#### T-Test Result of p=.36



Can we be confident that there is a significant difference between girls and boys in the number of hours spent in 4-H activities each week?

No





#### Two-tailed T-Test on Unpaired Data Using Toolpak

G	Н		J	K
t-Test: Two	-Sample As	ssuming Un	equal Varia	nces
	Variable 1	Variable 2		
Mean	3.630769	3.388235		
Variance	2.424038	2.859384		
Observatio	65	85		
Hypothesiz	0			
df	143			
t Stat	0.910645			
P(T<=t) on	0.182007			
t <del>Critical o</del>	1.655579			
P(T<=t) two	0.364015	)		
t Critical tv	1.976692			





#### Remember,

- Look back at the video.
- Don't be intimidated.
- Ask for help.





#### I. Data Management

#### **Data Entry Quality Tool = Data Validation**

You can use data validation to restrict the type of data or the values that users enter into a cell. One of the most common data validation uses is to create a drop-down list.







#### **Data Validation**

- 1) Select the cells that you want to include in the data validation.
- 2) Choose an empty space in your spreadsheet and type in the answers you will accept.
- **3)** Click on your data validation option.









## **Data Validation**

- 4) The data validation dialog box will open.
- 5) In "Allow," choose the drop-down box and choose "List."
- 6) You will then have to tell Excel what list to use.
- 7) Go back to the area of the sheet where you typed in the allowable entries and drag across those boxes.

ettings Input Message Error Alert  Alidation criteria  Allow:  Any value  Ignore blank  Data:  between  Apply these changes to all other cells with the same settings  Clear All OK Canc	Input Message Error Alert     alidation criteria   Allow:   Any value     Ota:   between   Apply these changes to all other cells with the same settings   Clear All   OK Cancel	ta Validation			?
Allow: Any value  Data: between  Apply these changes to all other cells with the same settings  Clear All OK Canc	Allow: Any value  Data: between  Apply these changes to all other cells with the same settings  Clear All  OK  Cance	ettings Input Mes	sage Error Alert		
Allow: Any value view ignore blank Data: between view Apply these changes to all other cells with the same settings Qiear All OK Canc	Allow: Any value Any value Data: between Apply these changes to all other cells with the same settings Clear All OK Cance	alidation criteria			
Any value     Ignore blank       Data:     Ignore blank       between     Ignore blank       Apply these changes to all other cells with the same settings       Qlear All     OK     Cancel	Any value     Ignore blank       Data:     Ignore blank       between     Ignore blank       Apply these changes to all other cells with the same settings       Clear All     OK	Allow:			
Data: between	Data: between	Any value	🗸 🗹 Ignore blank		
Apply these changes to all other cells with the same settings           Clear All         OK         Cancel	Apply these changes to all other cells with the same settings  Clear All OK Canc	Data:			
Apply these changes to all other cells with the same settings           Qlear All         OK         Cancel	Apply these changes to all other cells with the same settings  Clear All OK Canc	between	~		
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Aquaculture & Seafood Production Forestry Land Use and Watershed Master Gardener	Aquaculture & Seafood Production Forestry Land Use and Watershed Master Gardener	Apply these change Clear All Aquaculture Forestry Land Use ar Master Gare	es to all other cells with the sar e & Seafood Proc nd Watershed dener	ok OK	Car
Aquaculture & Seafood Production Forestry Land Use and Watershed Master Gardener Crop Production	Aquaculture & Seafood Production Forestry Land Use and Watershed Master Gardener Crop Production	Apply these change Clear All Aquaculture Forestry Land Use ar Master Gare Crop Produc	es to all other cells with the sar e & Seafood Proc nd Watershed dener ction	ok luction	Car





## **Data Validation**

- Users can only choose what you have listed.
- This eliminates user error in data entry.

(	C		D	
Please selec	t the worksh	The p	oresenter wa	as
QID19		QID1	1	
	(			
	Please choos	e a fo	cus area	
	Please choose one of the focus areas from this list. Click on the			
	upside down	triang	le to see the	
	list.			