Analyzing Quantitative Data

This project is made possible by a grant from the U.S. Institute of Museum and Library Services.

Analyzing Quantitative Data “Lite”

Descriptive versus Inferential Statistics

Basic Computations

Leveraging Pivot Tables

Other Statistical Tools

Descriptive versus Inferential Statistics

Descriptive Statistics

Summarize the characteristics of the dataset.

Includes statistics like:

- Counts (frequencies)
- % of Total
- Sum (total)
- Product (multiply)
- Mean (average)
- Median (mid-point)
- Mode (most frequent item in a list)

Inferential Statistics

Allow you to test a hypothesis, make predictions, and assess whether the data is generalizable to the broader population.

Includes statistics like:

- T-tests
- Analysis of Variance (ANOVA)
- Regression
- Correlation

Download the Excel file to follow along: Sample Data for Analysis.xlsx

Conducting Basic Computations in Excel

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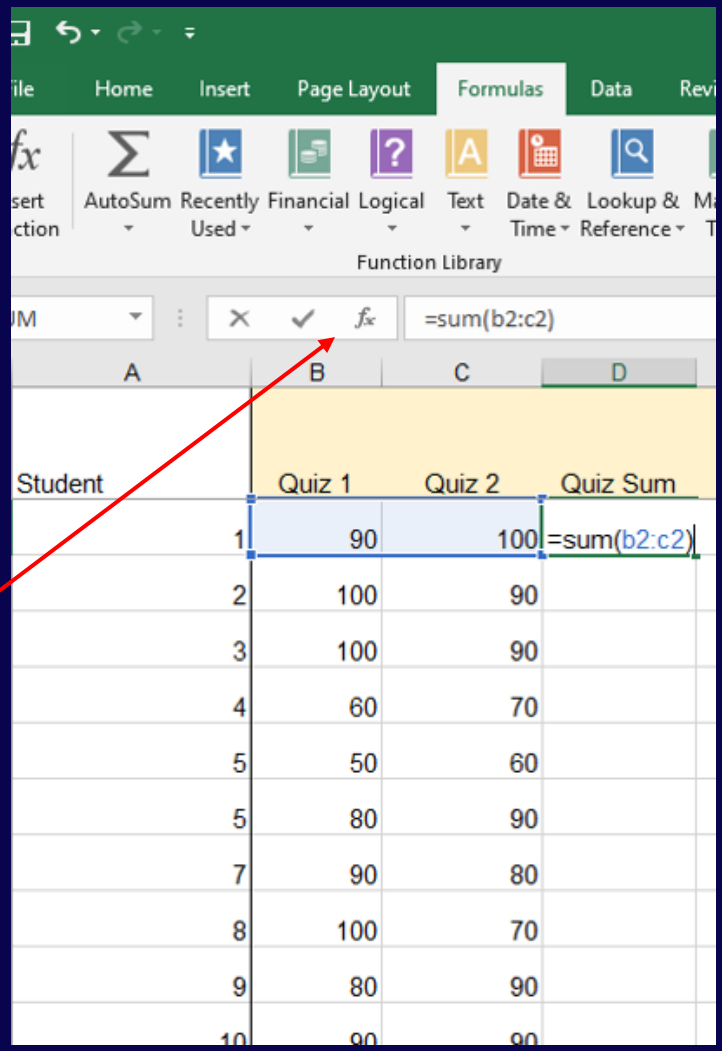
Setup for Basic Mathematical Computations

- All formulas and functions start with an =
- For basic computations, use +, -, *, and /
- For more complex formulas, start with =, followed by the mathematical term (e.g., sum), followed by the range of interest.
  - EX: =sum(a2:a75) will add up all numbers in column A from row 2 to row 75.
- Begin a formula by clicking in a cell and typing in your formula…or click the *fx* next to the formula box to activate the formula wizard.



Leverage Pivot Tables to Aggregate, Summarize, and Compute Descriptive Statistics

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More Robust Statistical Tools

What are Pivot Tables and Why Do They Matter?

What?

- One of the most powerful and useful tools in Excel (and Google Sheets).
- Allows for quick calculations, summarization, filtering, and analysis
- You can create graphs directly from pivot table data.

Why?

- Quick
- Simple
- Minimizes risk of human error
- Helps viewers visualize data in different ways and facilitates making comparisons and finding patterns and trends in your data.

From Worksheet to Pivot Table

Survey Worksheet

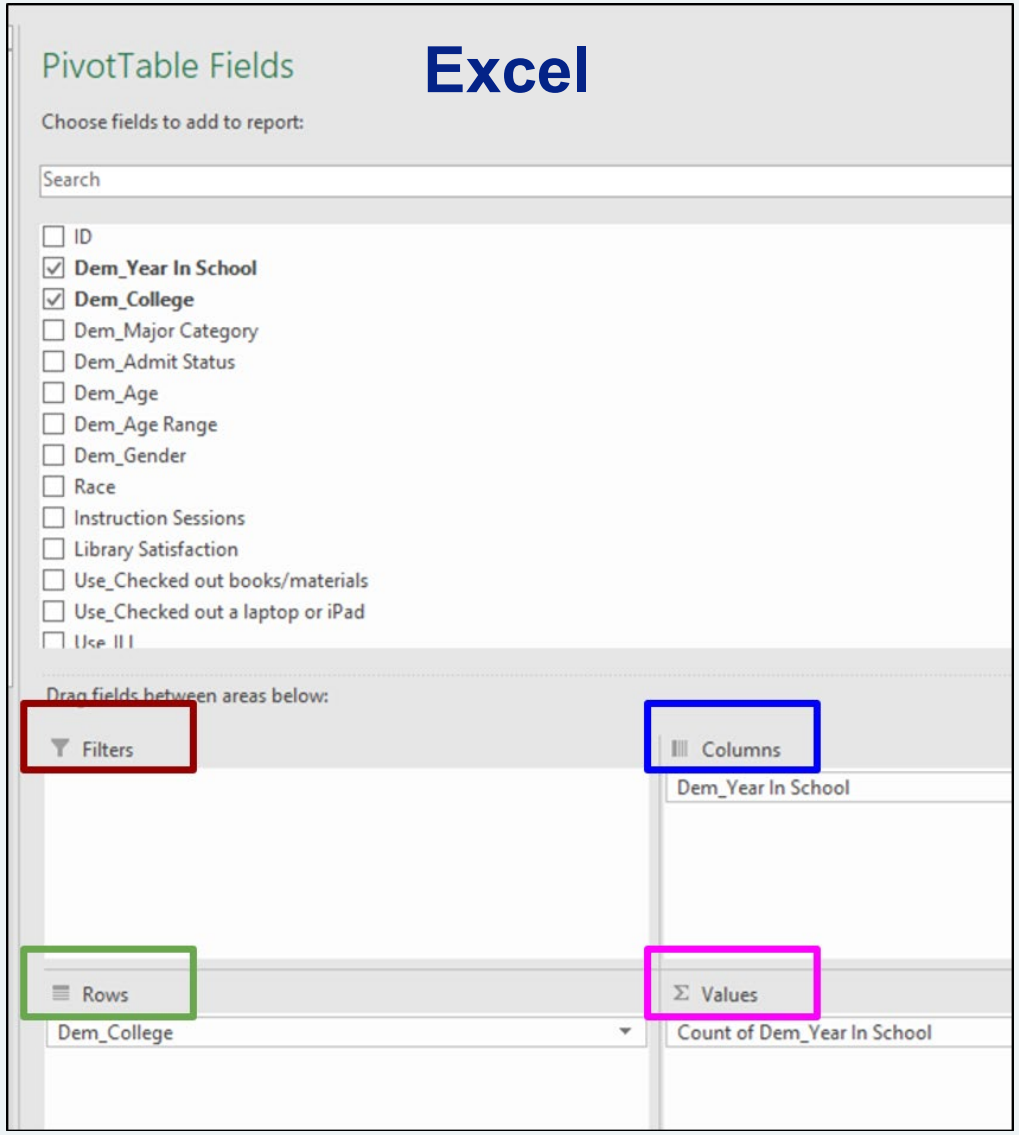
E16 | New Freshman

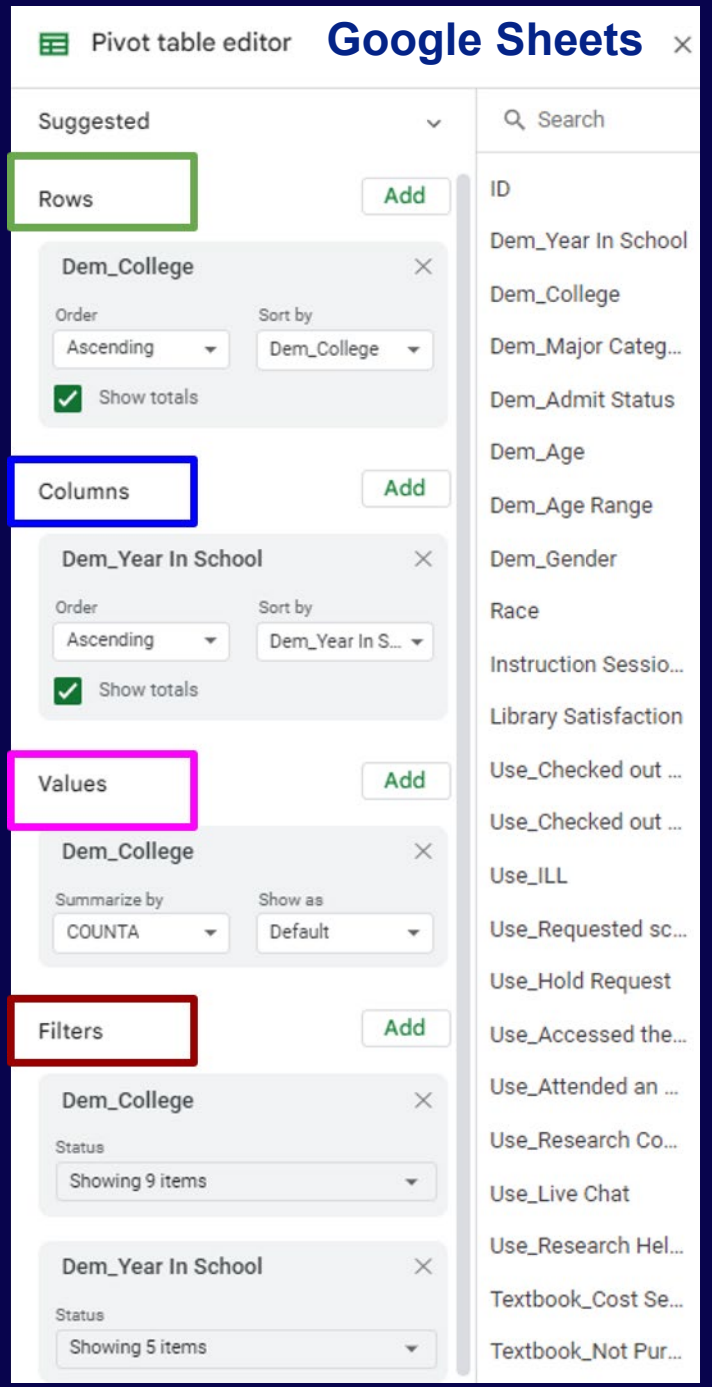
	A	B	C	D
1	ID	Dem_Year In School	Dem_College	Dem_Major Category
2	1	Graduate Student	Education	ITCS
3	2	Junior	Liberal Arts & Sciences	PSYC
4	3	Freshman	Liberal Arts & Sciences	COMS
5	4	Freshman	Liberal Arts & Sciences	CJUS
6	5	Junior	Liberal Arts & Sciences	POLS
7	6	Junior	Business	MGMT
8	7	Freshman	Health & Human Services	NURS
9	8	Senior	Liberal Arts & Sciences	COMS
10	9	Graduate Student	Liberal Arts & Sciences	HIST
11	10	Sophomore	Liberal Arts & Sciences	COMS
12	11	Junior	University College	UCOL
	12	Junior	Health & Human Services	KINE

Pivot Table

Row Labels	Freshman	Graduate Student	Junior	Senior	Sophomore	Grand Total
2+ Colleges	7	4	11	15	12	49
Arts & Architecture	10	5	17	9	12	53
Business	49	33	75	72	34	263
Computing & Informatics	11	81	27	31	28	178
Education	13	60	17	12	19	121
Engineering	28	60	43	26	25	182
Health & Human Services	56	49	57	55	45	262
Liberal Arts & Sciences	51	96	181	171	79	578
University College	63	2	14	2	22	103
Grand Total	**288**	**390**	**442**	**393**	**276**	**1789**

Pivot Table Editors





Guided Practice Examples

Example 1: Year in School (Frequency & % Total)

1. Insert > Pivot
2. Year in School > Rows
3. Year in School > Values (count)
4. Year in School > Values (count) > Right Click > Show values as % of total column
5. Right click on "No response" in table > Filter > Hide Selected Items
6. Right click on "blank" in table > Filter > Hide Selected Items

Row Labels	Count of Dem_Year In School	Count of Dem_Year In School2
Freshman	289	15.79%
Graduate Student	393	21.48%
Junior	444	24.26%
Other	30	1.64%
Senior	397	21.69%
Sophomore	277	15.14%
Grand Total	**1830**	**100.00%**

Example 2: Library Satisfaction x Admit Status x College

1. Admit Status > Rows
2. College > Columns
3. Library Satisfaction > Values
4. Value Field Settings > Average
5. Value Field Settings > Number > Number > 1 Decimal Place
6. Right click on "(blank)" and "no response" in rows and columns > Filter > Hide

Average of Library Satisfaction	Column Labels				
Row Labels	2+ Colleges	Arts & Architecture	Business	Computing & Informatics	Education
New Freshman	8.1	8.5	8.1	8.2	8.8
New Graduate Student	9.0	8.0	7.6	7.8	8.2
New Transfer Student	8.2	7.9	8.1	7.8	8.6
Other	7.0	10.0	7.2	8.3	7.7
Grand Total	**8.1**	**8.3**	**8.1**	**7.9**	**8.4**

While Excel and Google Sheets are quite powerful … more robust stats tools are recommended for inferential statistics.

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Popular Statistical Packages

Tool	Primary Purposes	Advantages	Disadvantages
SPSS *Statistical Package for the Social Sciences*	• Advanced analytics • Text analytics • Trend analysis • Validation of assumptions • Developed for social sciences	• **Easy to use**; requires minimal coding • Users have a lot of control over data management • Fast, accurate data results	• Limited data storage facilitate • Can be slow processing large datasets • Requires expensive license
SAS *Statistical Analysis System*	• Statistical modeling • Predictive analytics • Business intelligence • Data management • Multivariate analysis • Common in biometrics, clinical research, and banking	• **Stable and reliable** • **Well suited for large datasets** • A robust libraries of statistical techniques • Facilitates interaction with other tools like Excel, SPSS, Stata • Active support center	• Requires an **expensive license** • Minimal graphic visualization • Often requires "for-cost" add on licenses
R	• Statistical modeling and computations • Popular for specific functionalities for data analysis & graphing	• **Open source** (no license needed) • Very **large range of functions** • Robust data wrangling • Facilitates visually appealing graphics	• **Steep learning curve** • Not meant for beginners with little or knowledge of statistics • Uses a lot of memory • Not secure

Sources: https://data-flair.training/blogs/data-analytics-tools/ *and* https://data-flair.training/blogs/data-analytics-tools/

Let’s Recap

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