



# Egad! It's Excel

Data Boot Camp  
Lesson 1.2



**I asked my dad if he knew any formulas in Excel...**

"Yeah, *sum*" (I'll walk away now)...

# A Few Admin Things

# Class Repository and Zoom Video Feed

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## Class Git Repository

Classroom content,  
homework assignments

## Class Videos

Automatically uploaded,  
on-demand videos

# Quick Refresher



**Data analytics is about what two things?**



**Fundamentally, data analytics  
is about storytelling and truth-telling.**



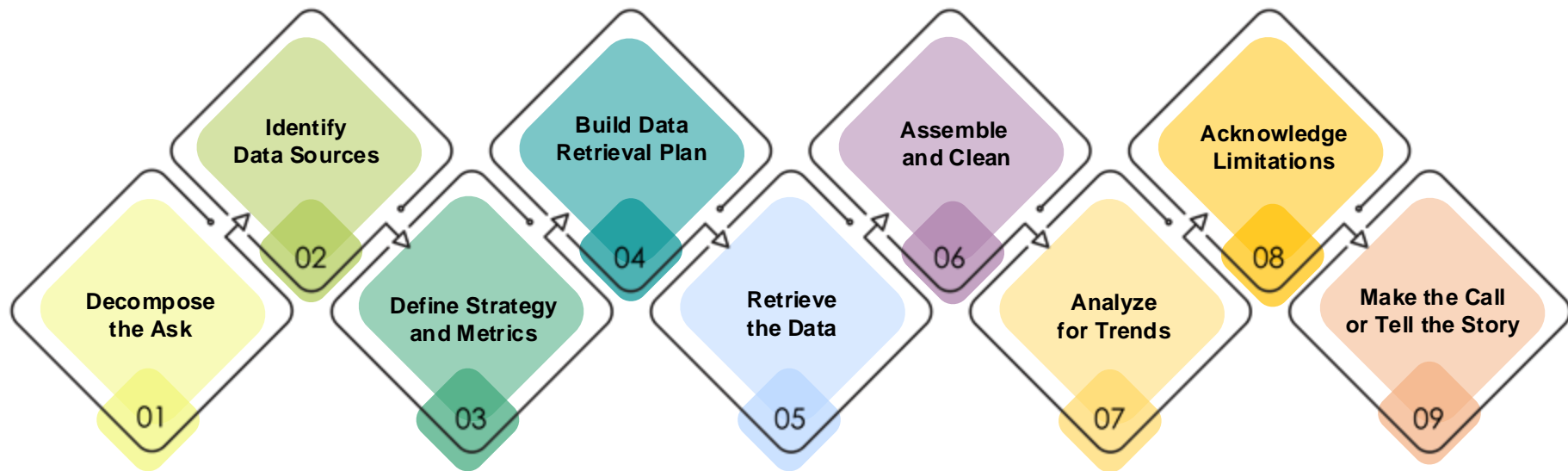


**What are the steps in  
the Analytics Paradigm?**

# Analytics Paradigm

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Regardless of type or industry, this paradigm provides a repeatable pathway for effective data problem solving.



# Let's Start with the Basics

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# Instructor Demonstration

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## Excel Playground



**Let's get Started!**



# Formulas

# Ooh...Coding! (Sort Of)

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Excel has introduced you to a sort of proto-programming. When you write scripts, you will rely on **functions** (methods) that do something to or with **arguments**.

=

SUM(

1, 2, 3

)

Function

Arguments

Function

# Ooh...Coding! (Sort Of)

---

When we reference a range or a set of ranges, Excel is given a set of **variable** inputs. Excel will determine the actual values of these inputs prior to executing the function.

=

AVG(

F4:F6

)

Function

Variable Arguments

Function



# Ooh...Coding! (Sort Of)

---



**What about this example?**

Which is the **function**?

Which are the **arguments**?

```
= SUM(  AVG(F4:F6),  AVG(G4:G6)  )
```

# Ooh...Coding! (Sort Of)

---



What about this example?  
Which is the **function**?  
Which are the **arguments**?



The **AVG functions** take  
the provided ranges as  
their arguments.

```
= SUM(  AVG(F4:F6),  AVG(G4:G6)  )
```

# Ooh...Coding! (Sort Of)

---



What about this example?  
Which is the **function**?  
Which are the **arguments**?



This is a **nested function**.  
We'll be doing plenty  
of complex nests in  
this class.

```
= SUM( AVG(F4:F6),  AVG(G4:G6) )
```

# You Can Code Too!

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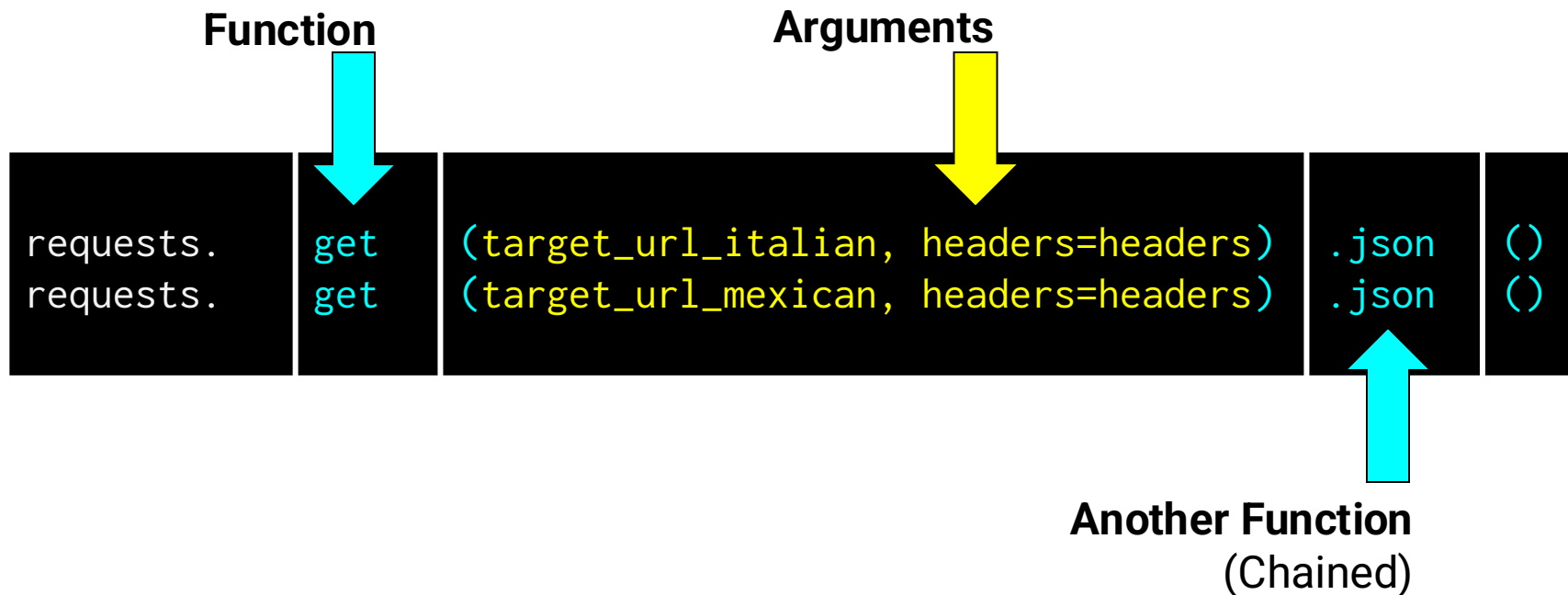
Here's a Python snippet from the last class.



```
requests.get(target_url_italian, headers=headers).json()  
requests.get(target_url_mexican, headers=headers).json()
```

# You Can Code Too!

Syntax and capabilities may differ across technologies and platforms, but fundamental concepts remain the same.





Time to <code>



# Instructor Demonstration

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## Named Ranges

# There are multiple ways to select data in a formula

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Most of us learned to select a range of cells to input into a function

```
=AVG(A1:A10)
```



# There are multiple ways to select data in a formula

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But we can name a range of values to make interpreting formulas easier!

`=AVG(A1:A10)`



`=AVG(prices)`



Time to <code>



## Instructor Demonstration

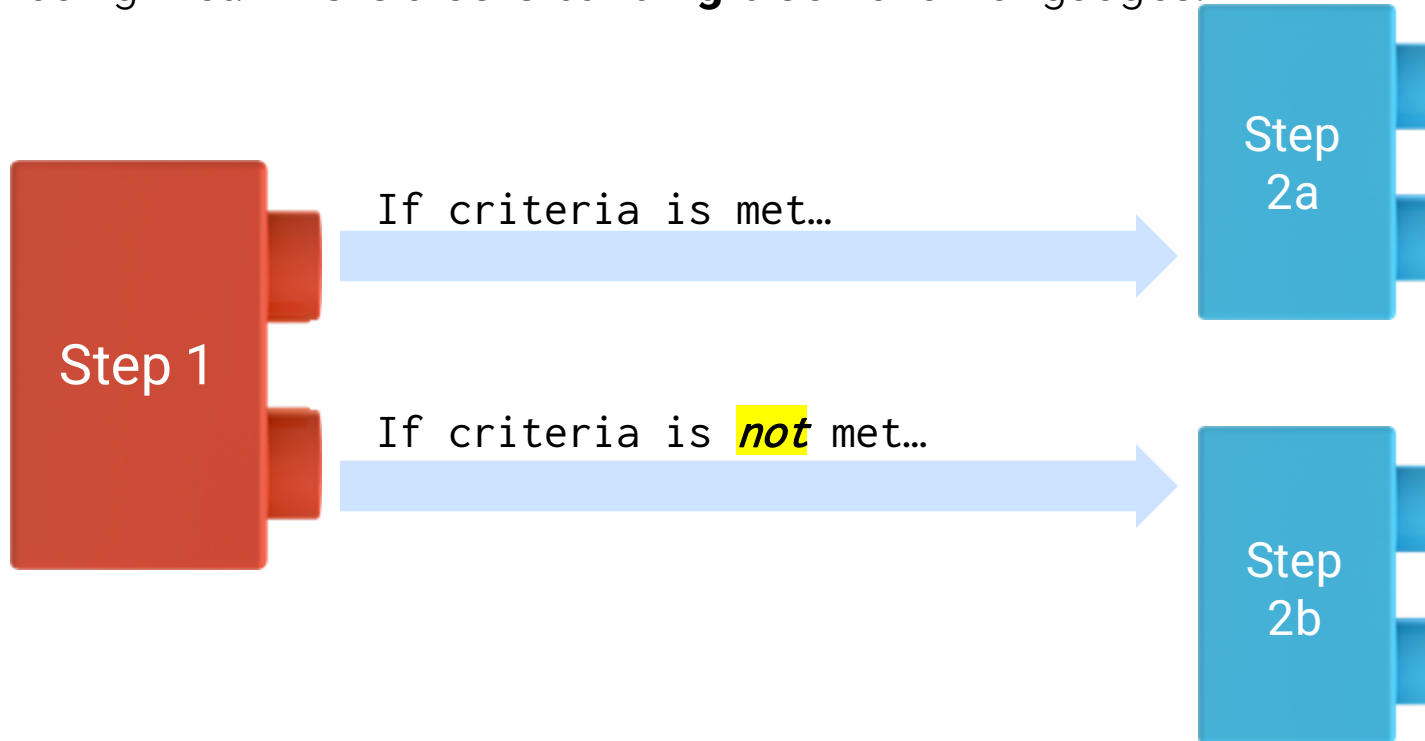
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Color Counter...i.e. Conditionals (if...else)

# Conditionals: If This, Then That

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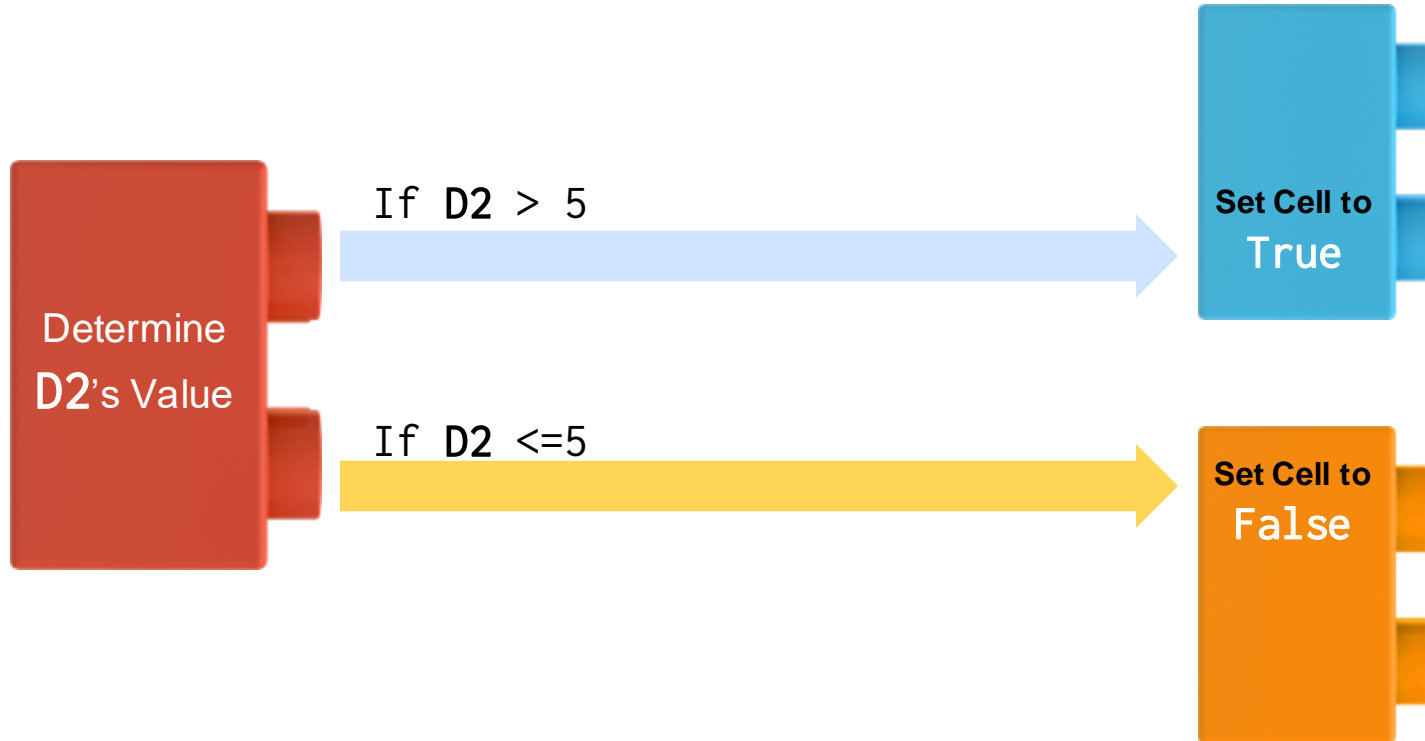
Conditionals present a way to control the flow of logic based on certain criteria being met. This is a **core building block** of all languages.



# Conditionals: If This, Then That

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=IF(D2>5, TRUE, FALSE)





**But what if we want to  
combine conditions?**



AND , NOT , OR

## Ooh...Coding! (Sort Of)

---



But what if we want  
to **combine** conditions?



AND, NOT, OR

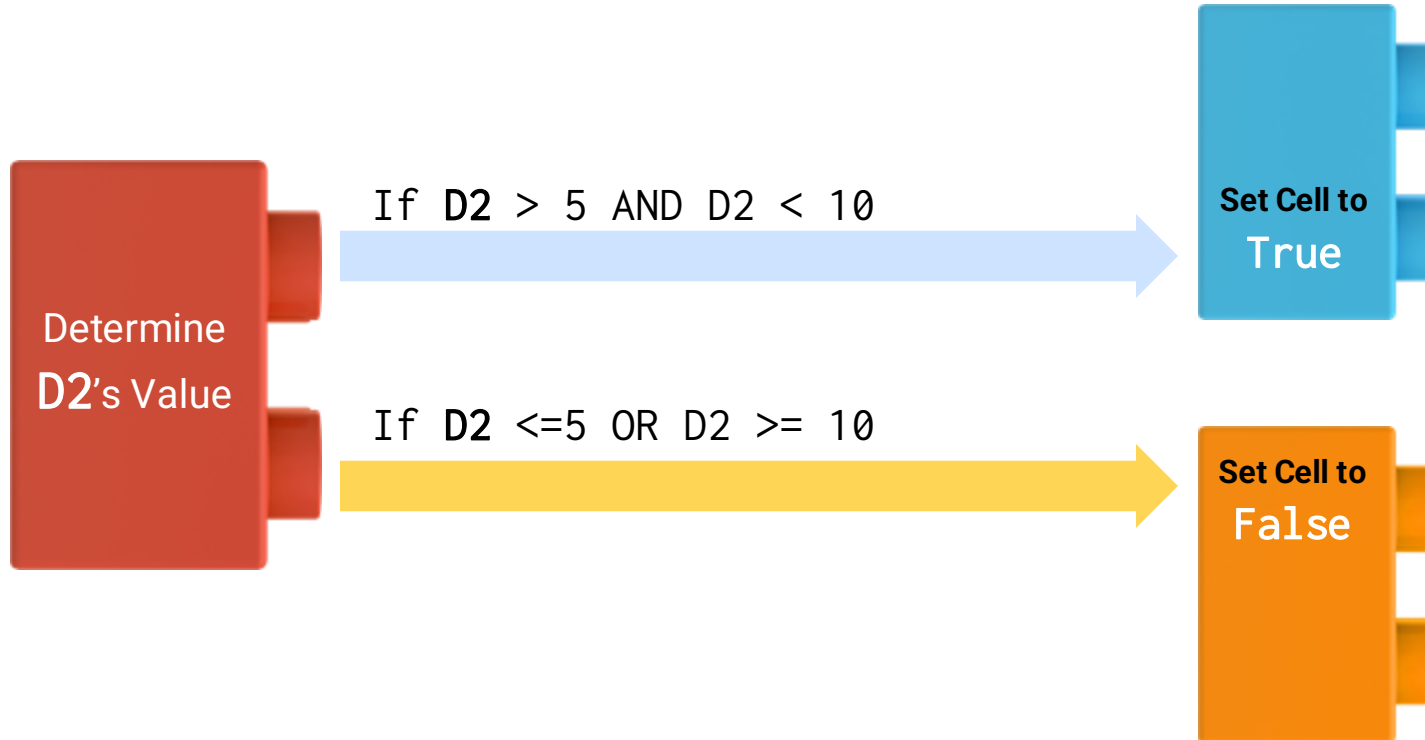
```
=IF(AND(D2>5, D2<10),TRUE,FALSE)
```



# Conditionals: If This, Then That

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Nesting conditionals are powerful, but can become convoluted very quickly!





Time to <code>



# Activity: Gradebook

Create a formula that calculates the final grade for a student based on their previous exams and papers.

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Suggested Time:

15 minutes

# Activity: Gradebook

## To do

- Create a formula which calculates the final grade for a student based upon their previous exams and papers.

## When making this calculation

- Consider every paper and exam to be equal in weight; each should comprise one-fourth of the overall grade.
- Round the result to the nearest integer.
- Using conditionals, create a formula that returns **PASS** if a student's final grade is greater than or equal to 60. If a student's final grade is below 60, the formula should return **FAIL**.

## Bonus

Create a nested **IF()** formula that returns a letter grade based on a student's final grade.

- Greater than or equal to 90 = A
- Greater than or equal to 80 and less than 90 = B
- Greater than or equal to 70 and less than 80 = C
- Greater than or equal to 60 and less than 70 = D
- Anything less than 60 = F



Time's Up! Let's Review.



# Instructor Demonstration

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## Measures of Central Tendency



What are “measures of central tendency”?



**Values used to describe the center of a data set.**



# Central Tendency

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Three most common measures of central tendency:

## Mean

**The “arithmetic” average**

**To calculate:** The sum of all values, divided by the number of values

## Median

**The middle value of a data set**

**To calculate:** Sort the data set and find the center

## Mode

**The most frequent value of a data set**

**To calculate:** Count the frequency of each value in a data set, determine the most frequent value



Time to <code>



A close-up photograph of a computer keyboard. The central focus is a large, white, rectangular key with rounded corners. On this key, there is a dark blue icon of a coffee cup with three wavy lines above it representing steam. Below the icon, the word "Break" is printed in a dark blue, serif font. The key is set against a background of other standard keyboard keys, which are slightly out of focus. The lighting is soft and even, highlighting the texture of the keys.

Break



# Instructor Demonstration

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## Formatting

# Formatting in Excel falls into two categories

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## Data Formatting

- Changes the way a value is represented in a cell.
- Used to help with interpretation or to add context to the range of values

### Examples

- Date and Time
- Currency
- Percentage

## Style Formatting

- Changes the way the cell and text are viewed
- Can include font color, cell highlighting, borders, etc.
- Can be performed manually or using formulas/logic (conditional formatting)



Time to <code>



# Instructor Demonstration

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## Pivot Tables

# Get Pivot With It

Pivot tables are one of the most important data visualization concepts to master in this class. (Don't worry. They are a cinch to deal with.)

The screenshot shows a PivotTable in Excel with the following data:

Sum of Revenue	Column Labels			
Row Labels	Cambridge	Piccadilly	Grand Total	
2014	\$ 1,111,886	\$ 1,214,733	\$ 2,326,619	
January	\$ 90,005	\$ 94,910	\$ 184,915	
February	\$ 104,397	\$ 133,914	\$ 238,311	
March	\$ 53,546	\$ 80,115	\$ 133,661	
April	\$ 103,543	\$ 98,960	\$ 202,503	
May	\$ 111,353	\$ 93,664	\$ 205,017	
June	\$ 94,292	\$ 98,108	\$ 192,400	
July	\$ 112,334	\$ 73,953	\$ 186,287	
August	\$ 68,446	\$ 76,590	\$ 145,036	
September	\$ 82,581	\$ 152,078	\$ 234,659	
October	\$ 103,366	\$ 78,984	\$ 182,350	
November	\$ 82,564	\$ 134,740	\$ 217,304	
December	\$ 105,459	\$ 98,717	\$ 204,176	
2015	\$ 1,286,966	\$ 1,523,054	\$ 2,810,020	
January	\$ 134,521	\$ 96,206	\$ 230,727	
February	\$ 85,955	\$ 140,144	\$ 226,099	
March	\$ 129,781	\$ 151,357	\$ 281,138	

The 'Insert Calculated Field' dialog box is open, showing the following details:

- Name: AverageRevenue
- Formula: = Revenue/Reservations
- Fields: Year, Quarter, Month, RoomType, Revenue, Reservations

The PivotTable Builder pane on the right shows the following configuration:

- Field Name: Search fields
- Filters: none
- Columns: RoomType
- Rows: Year, Month
- Values: Sum of Revenue

Drag fields between areas



# Get Pivot With It

In essence, a pivot table is a **summative** analytic tool that allows us to perform aggregate functions that allow any combination of fields. (The term *pivot table* comes from the fact that we are pivoting along a data axis).

Seller	Qty. Sold	Date
Joseph	\$42.50	1/1/17
Jacob	\$65.00	1/3/17
Jacob	\$5.25	1/6/17
Joseph	\$125.00	1/6/17
Jacob	\$3.50	1/7/17
Matt	\$32.00	1/9/17

Seller	Total Sold
Joseph	\$167.50
Jacob	\$73.75
Matt	\$32.00

# Word to the Wise: Keep It Flat!

Modern Business Intelligence (BI) tools like Tableau, Sisense, and Salesforce work best if data is stored in flat CSVs—meaning column headers represent fields (vertically) on the spreadsheet. This is largely because all of these technologies heavily utilize pivot tables as a tool for their visualizations. **Don't try to confuse this simplicity. "Spreadsheet magic" is a nightmare to analyze.**

B	C	D	E	F	G	H
DateTime	Week #	Section?	Pace	Academic Support	Self-Mastery	Instructor Eval
2016-09-11T04:00:00.000Z	18	RCB0503FSF - CCC	3	5	5	4
2016-09-11T05:00:00.000Z	6	UT0726FSF	3	5	3	4
2016-09-12T04:00:00.000Z	11	UCF062016FSF	4	4	3	5
2016-09-12T04:00:00.000Z	23	UCF0329FSF	2	4	5	1
2016-09-12T04:00:00.000Z	9	UNC0712FSF	3	4	4	3
2016-09-12T04:00:00.000Z	23	UCF0328FSF	4	3	2	3
2016-09-12T04:00:00.000Z	6	RUT0725FSF-NB	5	4	4	5
2016-09-12T04:00:00.000Z	6	RUT0725FSF-NB	5	5	4	5
2016-09-12T04:00:00.000Z	6	RUT0725FSF-NB	2	4	4	4
2016-09-12T04:00:00.000Z	11	UCF062016FSF	4	5	4	5
2016-09-12T04:00:00.000Z	13	UCF061416FSF	4	5	1	5



Time to <code>



# Activity: Top Songs Pivot Table

In this activity, you will use a 5000 row spreadsheet containing data for the top 5000 songs from 1901 onward. Using pivot tables, you will uncover which artists have the most songs in the top 5000, the song titles, and the year each song was released.

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Suggested Time:

17 minutes

# Top Songs Pivot Table Instructions

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Select all of the data in your worksheet and create a new pivot table.



Make a pivot table that can be filtered by year and contains two rows: *Artist* and *Name*.



All of an artist's songs should be listed below their name.

Update your pivot table to contain values for:



How many songs an artist has in the top 5000



The sum of the `final_score` of their songs.



Sort your pivot table by descending sum of the `final_score`.



Time's Up! **Let's Review.**



# Instructor Demonstration

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## Lookups

# Look It Up with Lookups



Assume this table is gigantic. How would we **retrieve** the population of a specific planet for use in another formula?

Planet	Population
Zeelo	5020
Merinoa	380
Cardboard Box	2
...	...
Asteroid 9	95



# Look It Up with Lookups



Assume this table is gigantic. How would we **retrieve** the population of a specific planet for use in another formula?



```
=vlookup( <value>, <full table>,  
<column to retrieve>,<match parameter>)
```

Planet	Population
Zeelo	5020
Merinoa	380
Cardboard Box	2
...	...
Asteroid 9	95

# Look It Up with Lookups



What will this yield?

`=vlookup( "Asteroid 9", Planets, 3, FALSE)`

Planet	Population	Species
Zeelo	5020	Zoltans
Merinoa	380	Murphies
Cardboard Box	2	Hambones
...	...	
Asteroid 9	95	Asterisks

# Look It Up with Lookups



What will this yield?

`=vlookup( "Asteroid 9", Planets, 3, FALSE)`

Planet	Population	Species
Zeelo	5020	Zoltans
Merinoa	380	Murphies
Cardboard Box	2	Hambones
...	...	
Asteroid 9	95	Asterisks





Time to <code>



# Partner Activity: Product Pivot

An independent artist who sells their designs on products in an online store has called upon the class to create a table which visualizes the cost of their recent orders. Using lookups, create a pivot table which serves this purpose.

Suggested Time:

15 minutes

# Partner Activity: Product Pivot

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Determine the "Product Price" of each row in the "Orders" sheet by using a **VLOOKUP()** that references each row's "Product ID"



The "Product Price" of a row does not include shipping



Determine the "Shipping Price" of each row in the "Orders" sheet by using a **VLOOKUP()** that references each row's "Shipping Priority"



Select all of the data on the "Orders" sheet and create a new pivot table that calculates the sum of both "Product Price" and "Shipping Price" for each "Order Number" and "Product ID"



Time's Up! **Let's Review.**

# Questions?

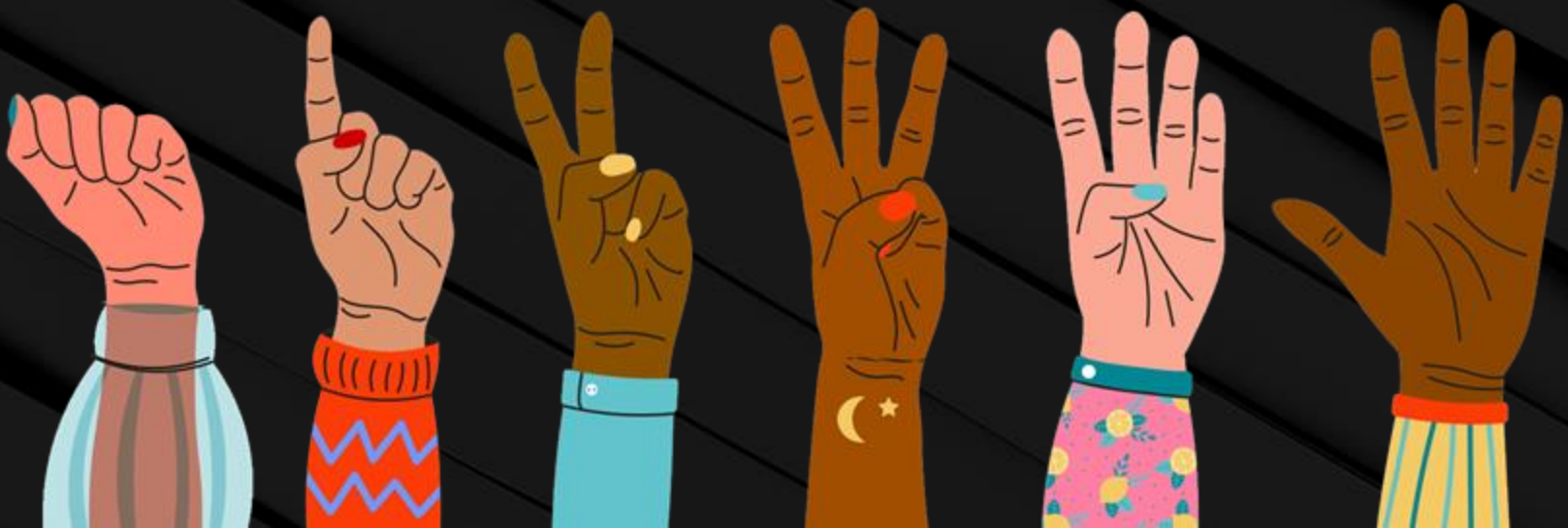




## FIST TO FIVE:

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Who feels comfortable  
with pivot tables in Excel?



## FIST TO FIVE:

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Who feels comfortable with the  
Measures of Central Tendency?

