



# **Tableau Desktop 10 Qualified Associate**

## Lesson 05—Performing Calculations in Tableau

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DESKTOP 10**



# What's In It For Me

At the end of this lesson, you will be able to:

- Understand what is a calculated field
- Understand how to build arithmetic calculations
- Understand how to create quick table calculations
- Understand how to work with aggregation options
- Understand how to build logic statements
- Understand how to include grand totals and subtotals



# Performing Calculations in Tableau

## Topic 1: Calculated Fields

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# What are Calculated Fields?

Calculated fields are formulas that reference fields in the dataset (or other calculated fields).

The screenshot shows a software interface for creating calculated fields. The main window is titled 'Profit Margin' and 'Sample - Superstore'. It contains a text area with the formula `sum([Profit]) / sum([Sales])`. Below the formula, it states 'The calculation is valid.' and has 'Apply' and 'OK' buttons. To the right, there is a list of functions including ABS, ACOS, AND, ASCII, ASIN, ATAN, ATAN2, ATTR, AVG, CASE, CEILING, CHAR, CONTAINS, COS, and COT. Further right, a 'Profit' field is shown with a 'Data type: Float' and a 'Describe...' button. On the far right, a 'Measures' panel lists various calculated fields:

- =# 2013 sales
- =# Days to Ship Actual
- =# Days to Ship Schedul...
- # Discount
- # Profit
- =# Profit Margin
- =# Profit per Customer
- =# Profit per Order
- =# Profit Ratio
- # Quantity
- # Row ID
- # Sales
- =Abc Sales above Target?

# Using Calculated Fields

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Calculated fields are useful when the data does not include all of the fields required to perform the analysis. It uses:



standard operators (plus, minus, multiply, divide)



functions (average, median, minimum, maximum)



# Performing Calculations in Tableau

## Topic 2: Building a Calculated Field

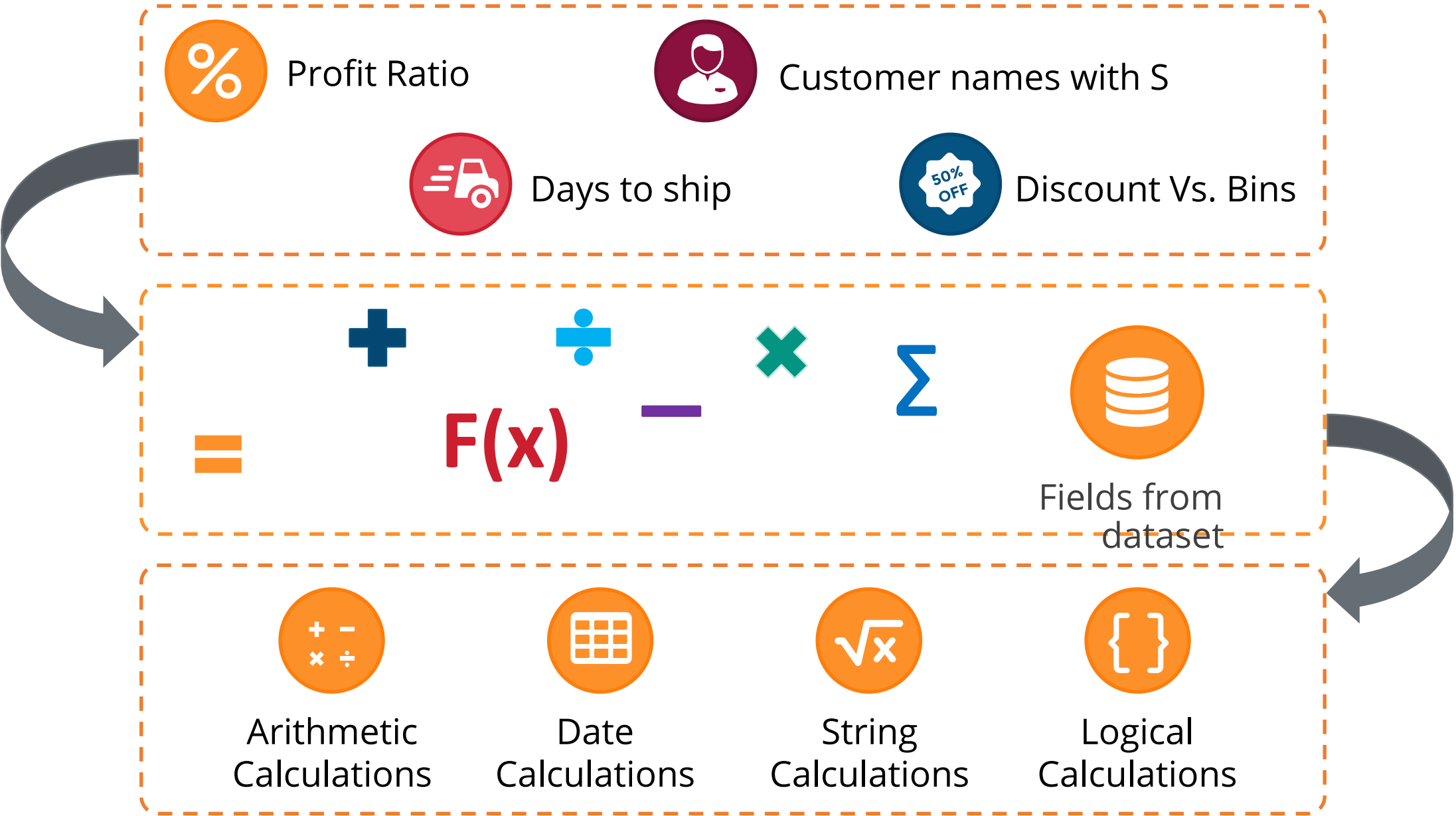
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# Building a Calculated Field

## TYPES OF CALCULATIONS

Tableau makes it possible to create new fields that are not present in your underlying data set.

Calculated fields are based on a formula defined by standard functions and operators along with existing fields from your dataset.



These fields from the dataset can be based on different types of calculations.



# Building a Calculated Field

## TYPES OF CALCULATIONS

### String Calculations

Customer Names with S

CONTAINS([Customer Name], "S")

The calculation is valid.

Apply

OK

### Logical Calculations

Discount V Bins

IF [Discount] < 0.2 THEN "LOW DSICOUNT"  
ELSEIF [Discount] >=0.2 AND [Discount] <0.6 THEN "MODERATE DISCOUNT"  
ELSE "HIGH DISCOUNT" END

The calculation is valid.

Apply

OK

### Date Calculations

Days to Ship

DATEDIFF('day', [Order Date], [Ship Date])

The calculation is valid.

Apply

OK

### Arithmetic Calculations

Profit Ratio

SUM([Profit])/SUM([Sales])

The calculation is valid.

Apply

OK



# Use Case 1

Schemes and Promotions offer retail stores a series of benefits and aids to increase sales. Genelia's next project is from a Retail store.

Michael Clint, the store manager of a retail store, plans to launch a new discount and pricing scheme.

For this, he wants to analyze the total expenses for each product sub-category across all the years to strategize a sales promotion scheme.

Let's understand how Genelia did this through a demonstration!





## Demo—Building a Calculated Field

Demonstrate how to create a calculated field using sales and profit to calculate the total expenses and create a text table with order date at year level, sub-category, and total expenses.



# Performing Calculations in Tableau

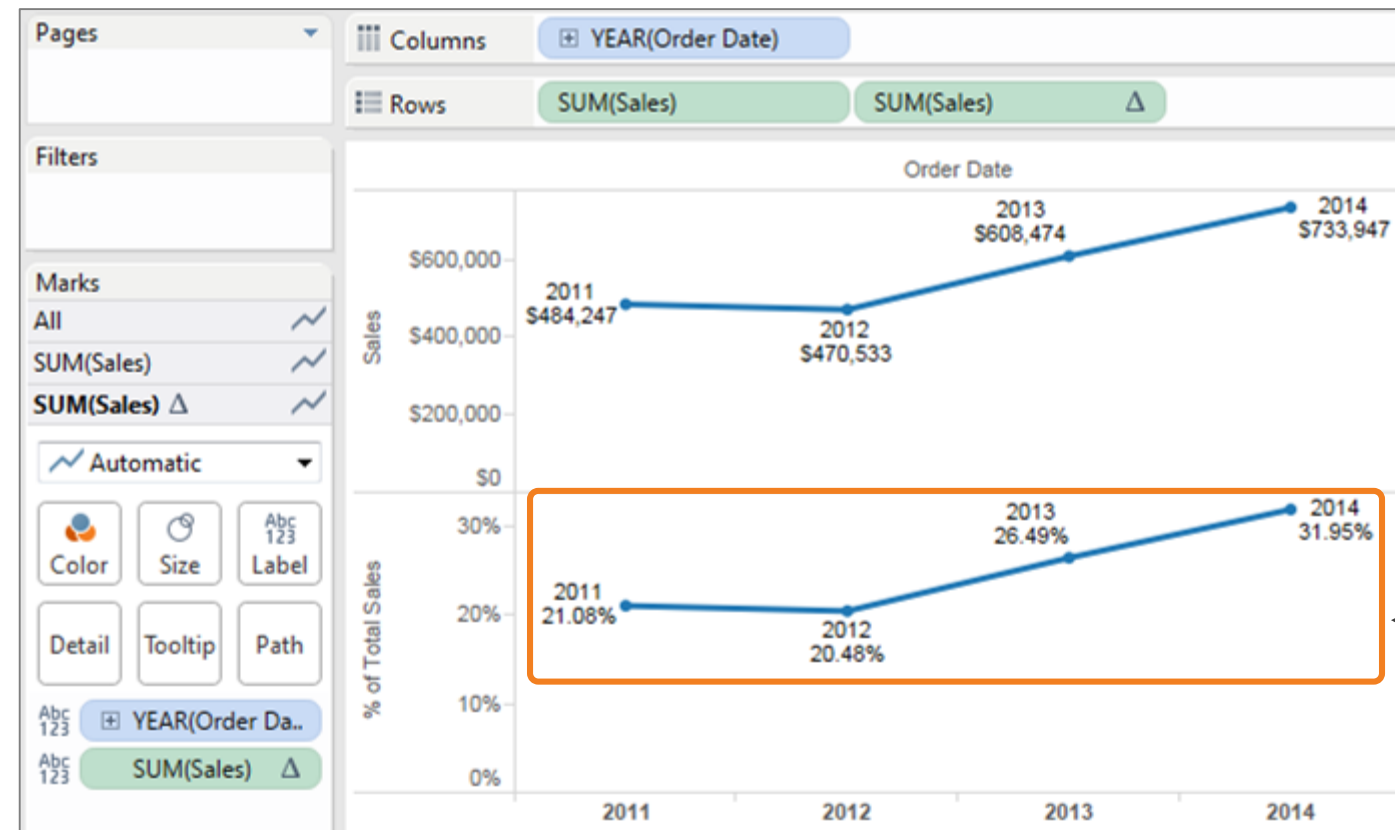
## Topic 3: Create Quick Table Calculations

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# Creating Quick Table Calculations

## INTRODUCTION

While Calculated Fields are created by the user, Quick table calculations are a set of pre-defined functions that the user can apply at the view level.



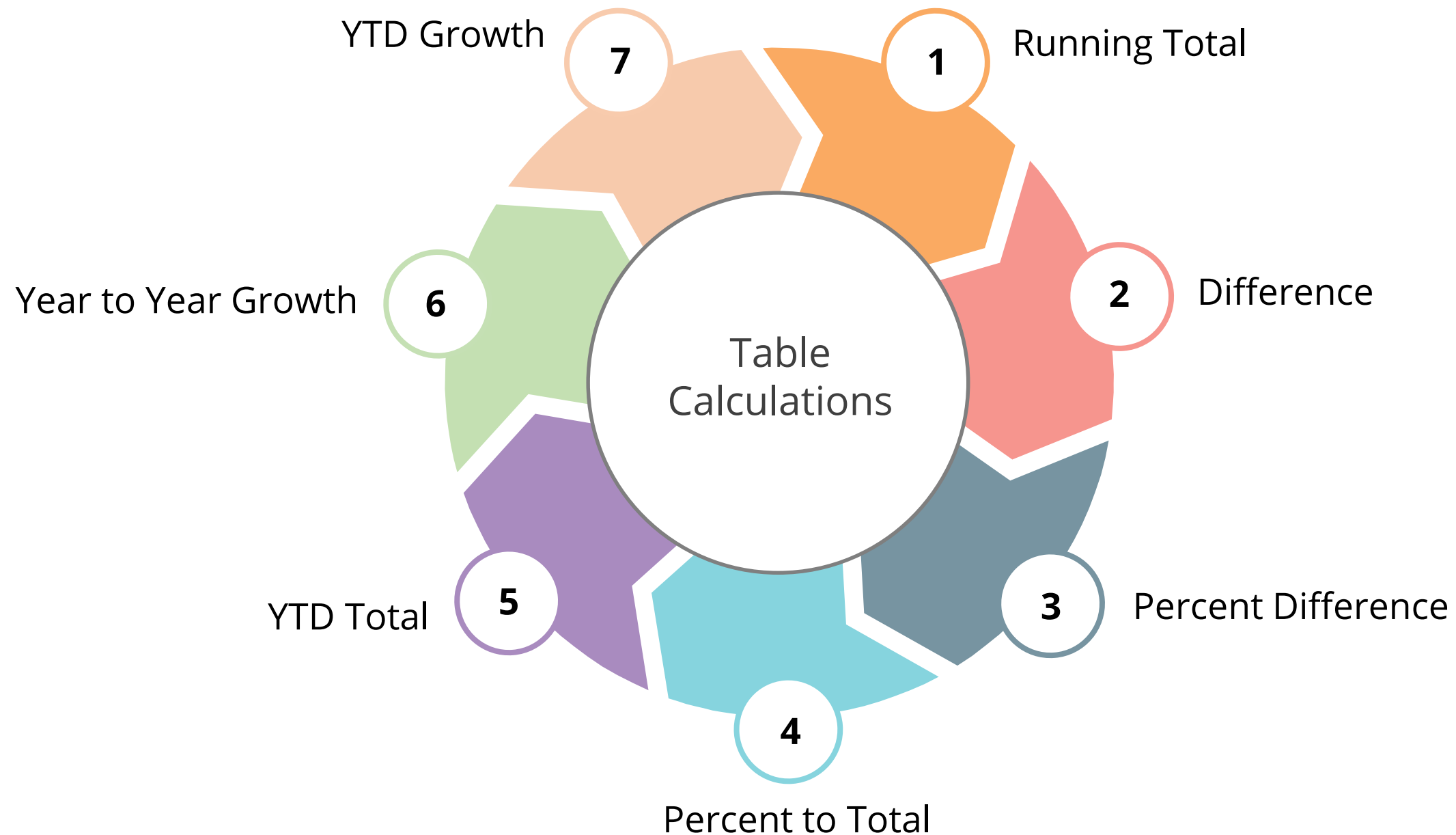
Percent to Total  
table calculation



# Creating Quick Table Calculations

## IN-BUILT FUNCTIONS

Some of the built-in Tableau functions to perform Quick Table Calculations are:





## Demo—Working with Quick Table Calculations

Demonstrate how to create a line chart with sales by order date at yearly level, drill down from year to quarter, create and add table calculation for difference, and pivot the sales pill from the Rows shelf to the color shelf in the Marks card.



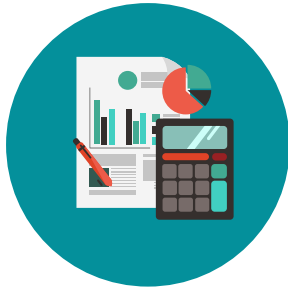
# Performing Calculations in Tableau

## Topic 4: Aggregation Options

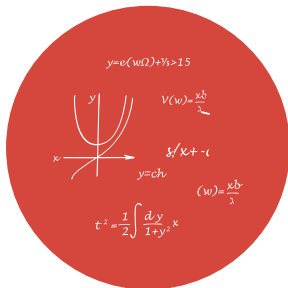
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# Aggregation Options

## INTRODUCTION



Calculated fields and Quick Table calculations utilize different types of aggregations, such as “Sum of Sales” or “Average of Profit.”



Aggregation functions are mathematical functions used to produce aggregated data.



# Aggregation Options

## FUNCTIONS

Tableau provides the following aggregation functions:

➤ Attribute

➤ Dimension

➤ Sum

➤ Average

➤ Median

➤ Count

➤ Count (distinct)

➤ Minimum

➤ Maximum

➤ Std.Dev

➤ Std.Dev (Pop)

➤ Variance

➤ Variance (Pop)

➤ Disaggregate

# Aggregation Options

## MEASURES

Tableau automatically aggregates its values for measures. Each Measure has a default aggregation. The current aggregation is included in the measure's name in the view.

Example: **Sales** becomes **SUM(Sales)**

Sort fieldsData source order

Order Date	Region	Sales Person	Sales
1/1/02 12:00:00 A...	Central	Donald Mitchell	74,814
1/1/02 12:00:00 A...	Central	Donna Walker	188,411
1/1/02 12:00:00 A...	Central	Jennifer Anderson	105,709
1/1/02 12:00:00 A...	Central	John Jones	658,205
1/1/02 12:00:00 A...	Central	Lisa Martin	417,542
1/1/02 12:00:00 A...	Central	Mark Carter	14,899
1/1/02 12:00:00 A...	Central	Michael Moore	541,602
1/1/02 12:00:00 A...	Central	Nancy Garcia	427,021
1/1/02 12:00:00 A...	Central	Sarah Scott	150,404
1/1/02 12:00:00 A...	Central	Susan Jackson	293,042
1/1/02 12:00:00 A...	Central	William Taylor	59,687
1/1/02 12:00:00 A...	East	Barbara Davis	403,469
1/1/02 12:00:00 A...	East	Carol Allen	448,279
1/1/02 12:00:00 A...	East	Charles Lee	562,354
1/1/02 12:00:00 A...	East	Christopher White	60,050

Describe Field

Sales

Role:Continuous Measure  
Type:Database column  
Remote column:[DATAS\$].[Sales]  
Remote type:Double-precision floating-point number  
Default aggregation:Sum  
Status:Valid

The domain for this field has not been loaded. Click "Load" to retrieve.

LoadCopyClose

\$59,686.53	Below 50%	\$50,000.00	12%	0.00
\$403,469.19	75-100%	\$50,000.00	81%	0.00
\$448,279.34	75-100%	\$50,000.00	90%	0.00
\$562,354.38	100% +	\$50,000.00	112%	0.00
\$60,050.47	Below 50%	\$50,000.00	10%	0.00

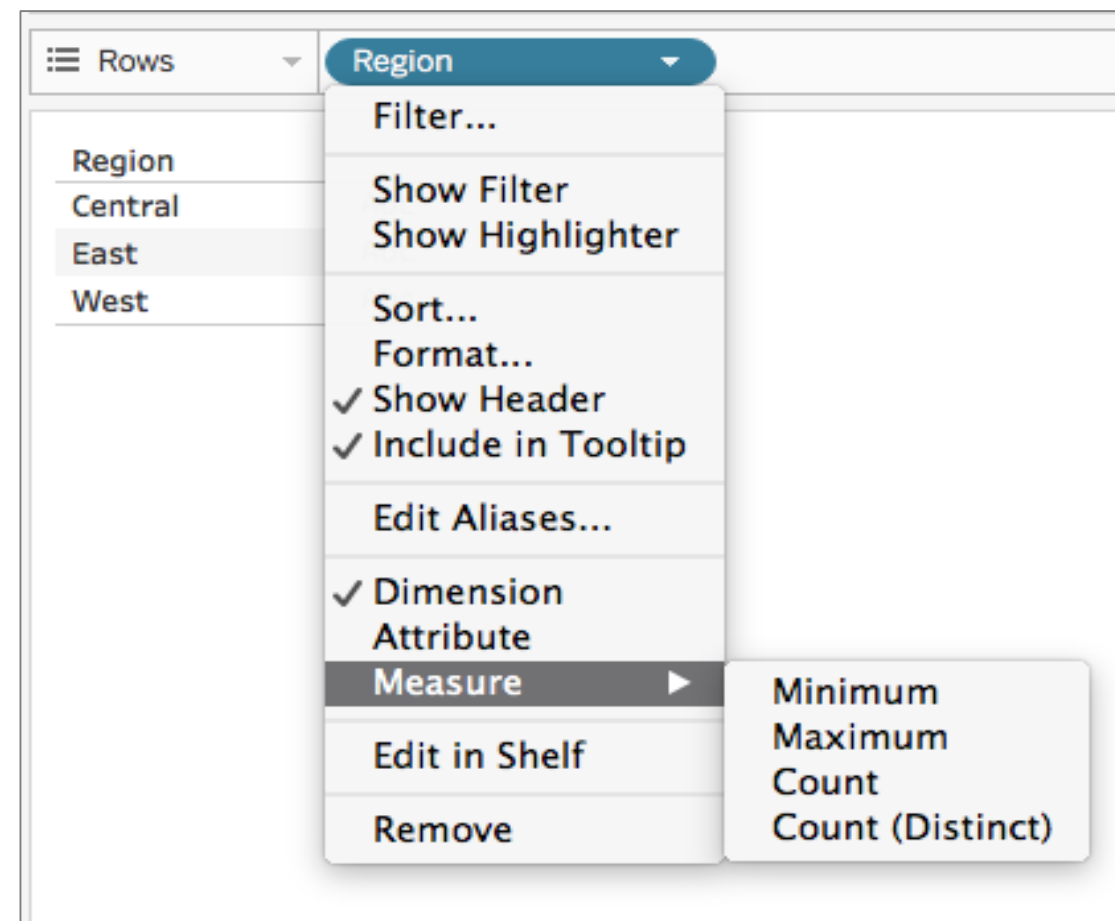


# Aggregation Options

## DIMENSIONS

Aggregating dimensions create a Measure field (for example, **Product ID** becomes **Count of Product ID**).

Dimensions can be aggregated with Maximum, Minimum, Count, and Count (Distinct).



Count (Distinct) is not supported in Microsoft Excel, Microsoft Access, or text files.

# Performing Calculations in Tableau

## Topic 5: Logic Statements

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# Logic Statements

Logic statements are incorporated into calculated fields to perform logical tests and return appropriate results.

## Example -

grouping customers by Age

```
IF [Age] <21 then "Under 21"  
ELSEIF [Age] <40 then "21-39"  
ELSEIF [Age] <60 then "40-59"  
ELSE "Over 60"
```

## Logic statements in Tableau:

```
CASE  
IF  
IFNULL  
ISDATE  
ISNULL
```

# Logic Statements

## CASE STATEMENT

Case  
Statement

IF Statement

**CASE** statement evaluates an expression, compares it to a sequence of values, and returns a result; it is typically more concise than IF statements.

IFNULL  
Statement

**SYNTAX** - CASE expression WHEN value1 THEN return1 WHEN value2 THEN return2...ELSE default return END

ISDATE  
Statement

**EXAMPLE** - CASE [Region] WHEN "South" THEN 1 WHEN "West" then 2 ELSE 3 END

ISNULL  
Statement



# Logic Statements

## IF STATEMENTS

Case  
Statement

IF Statement

**IF** statement evaluates a sequence of test conditions and returns for the value for the first condition that is true.

IFNULL  
Statement

**SYNTAX** - IF test1 THEN value1 ELSEIF test2 THEN value2 ELSE else END

ISDATE  
Statement

**EXAMPLE** - IF [Region]="West" then 1 ELSEIF [Region]="South" THEN 2 ELSE 3 END

ISNULL  
Statement

# Logic Statements

## IFNULL STATEMENTS

Case  
Statement

IF Statement

IFNULL  
Statement

ISDATE  
Statement

ISNULL  
Statement

**IFNULL** statement returns the first expression if the result is not null and returns the second expression if it is null.

**SYNTAX** - IFNULL(expression1, expression2)

**EXAMPLE** - IFNULL([Category],[Sub-Category])



# Logic Statements

## ISDATE STATEMENTS

Case  
Statement

IF Statement

IFNULL  
Statement

ISDATE  
Statement

ISNULL  
Statement

**ISDATE** statement returns TRUE if the field can be converted to a date and returns FALSE if the field cannot be converted to a date.

**SYNTAX** - ISDATE(string)

**EXAMPLE** - ISDATE("December 25, 2017")=TRUE

# Logic Statements

## ISNULL STATEMENTS

Case  
Statement

IF Statement

IFNULL  
Statement

ISDATE  
Statement

ISNULL  
Statement

**ISNULL** statement returns TRUE if the field is null and returns FALSE if it is not.

**SYNTAX** - ISNULL(expression)

**EXAMPLE** - ISNULL([Region])=FALSE



# Performing Calculations in Tableau

## Topic 6: Adding Grand Totals and Subtotals

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# Calculating Grand Totals and Subtotals

Once you have a complete set of data, including the fields from the data set, Calculated Fields, and Quick Table Calculations, you can add Grand Totals and Sub-totals to your view to present the aggregation of that data.

Analysis

Show Mark Labels

☒ Aggregate Measures

Stack Marks

View Data...

Reveal Hidden Data

Percentage of

Totals

Forecast

Trend Lines

Special Values

Table Layout

Legends

Quick Filters

Parameters

Create Calculated Field...

Edit Calculated Field

Cycle Fields

Swap Rows and Columns

Ctrl+W

☒ Show Row Grand Totals

☒ Show Column Grand Totals

Add All Subtotals

Remove All Subtotals

Total All Using

Pages

Columns

YEAR(Order Date)

Rows

Category

Sub-Category

Filters

Marks

Abc Automatic

Color

Size

Abc 123 Text

Detail

Tooltip

Abc 123

SUM(Sales)

		Order Date				Grand Total
Category	Sub-Category	2011	2012	2013	2014	
Furniture	Bookcases	\$20,037	\$38,544	\$26,275	\$30,024	\$114,880
	Chairs	\$77,242	\$71,735	\$83,919	\$95,554	\$328,449
	Furnishings	\$13,826	\$21,090	\$27,874	\$28,915	\$91,705
	Tables	\$46,088	\$39,150	\$60,833	\$60,894	\$206,966
	Total	\$157,193	\$170,518	\$198,901	\$215,387	\$742,000
Office Supplies	Appliances	\$15,314	\$23,241	\$26,050	\$42,927	\$107,532
	Art	\$6,058	\$6,237	\$5,910	\$8,914	\$27,119
	Binders	\$43,488	\$37,453	\$49,485	\$72,986	\$203,413
	Envelopes	\$3,856	\$4,512	\$4,730	\$3,379	\$16,476
	Fasteners	\$661	\$545	\$960	\$858	\$3,024
	Labels	\$2,841	\$2,956	\$2,827	\$3,861	\$12,486
	Paper	\$14,835	\$15,288	\$20,638	\$27,718	\$78,479
	Storage	\$50,329	\$45,048	\$58,632	\$69,834	\$223,844
	Supplies	\$14,394	\$1,952	\$14,278	\$16,049	\$46,674
	Total	\$151,776	\$137,233	\$183,511	\$246,527	\$719,047
Technology	Accessories	\$25,014	\$40,524	\$41,896	\$59,946	\$167,380
	Copiers	\$10,850	\$26,179	\$49,599	\$62,899	\$149,528
	Machines	\$62,023	\$27,764	\$55,907	\$43,545	\$189,239
	Phones	\$77,391	\$68,314	\$78,660	\$105,643	\$330,007
	Total	\$175,278	\$162,781	\$226,062	\$272,033	\$836,154

Grid displaying subtotals and grand totals





## Demo—Adding Grand Totals and Subtotals

Demonstrate how to add grand totals to rows and columns, change the placements of grand totals, add and remove sub-totals

## Use Case 2

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To ensure her company's sustainability, Genelia needs to identify business growth opportunities.

For this, she needs to determine and study the sales variance for year-over-year growth based on the quarterly breakdown.

How can she do that?



# Use Case 2: Solution

Genelia used a Quick Table calculation to compare quarter-over-quarter growth rates for the three product categories.

Pages

Filters

Marks

Measure Values

Columns

Rows

		Order Date							
		2014				2015			
Category		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Furniture	% Difference in Sales from the Previous Year of Order Date					-2.47%	6.82%	9.02%	11.74%
	Sales	\$24,021	\$40,464	\$53,558	\$80,859	\$23,428	\$43,223	\$58,389	\$90,348
Office Supplies	% Difference in Sales from the Previous Year of Order Date					47.45%	28.39%	62.52%	14.78%
	Sales	\$29,441	\$34,548	\$45,182	\$74,339	\$43,411	\$44,357	\$73,431	\$85,327
Technology	% Difference in Sales from the Previous Year of Order Date					33.02%	-23.05%	49.57%	30.02%
	Sales	\$39,134	\$60,358	\$45,875	\$80,695	\$52,057	\$46,444	\$68,613	\$104,919

Based on this analysis, she sees that Office Supply products sales grew substantially from Q3-2014 to Q3-2015 (62.52%), but in the following quarter (Q4-2015), Office Supply sales only grew 14.78% compared to Q4-2014.

She could use this data to investigate what drove the high growth rate in Q3 and the more modest growth rate in Q4.



# Quiz

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## QUIZ 1

Calculated fields cannot be based on \_\_\_\_.

- a. calculated fields
- b. groups
- c. sets
- d. geographic dimensions





## QUIZ

1

Calculated fields cannot be based on \_\_\_\_.

- a. calculated fields
- b. groups
- c. sets
- d. geographic dimensions



The correct answer is **b.**

Calculated fields cannot be based on groups.

## QUIZ 2

Which of the following aggregation functions can be applied to dimensions?

- a. Attr
- b. Std. Dev
- c. Variance
- d. Median



## QUIZ 2

Which of the following aggregation functions can be applied to dimensions?

- a. Attr
- b. Std. Dev
- c. Variance
- d. Median



The correct answer is **a.**

The Attr aggregation function can be applied to dimensions. It returns the value of the given expression if it only has a single value for all rows in the group; otherwise, it displays an asterisk (\*) character.



## QUIZ 3

What are calculations created by editing fields on shelves in the view called?

- a. Custom Split
- b. Ad-hoc calculation
- c. LOD calculation
- d. Table calculation



## QUIZ 3

What are calculations created by editing fields on shelves in the view called?

- a. Custom Split
- b. Ad-hoc calculation
- c. LOD calculation
- d. Table calculation



The correct answer is **b.**

Calculations created by editing fields on shelves in the view are called ad-hoc calculations.



## QUIZ 4

What aggregation is not compatible with an Excel, Access, or text file data source?

- a. Maximum
- b. Minimum
- c. Count
- d. Count (Distinct)



## QUIZ 4

What aggregation is not compatible with an Excel, Access, or text file data source?

- a. Maximum
- b. Minimum
- c. Count
- d. Count (Distinct)



The correct answer is **d.**

The Count (Distinct) aggregation is not compatible with Excel, Access, or text file data sources. This is a major shortcoming of Excel pivot tables.



## QUIZ 5

Row totals may be \_\_\_\_\_:

- a. Placed to the right of the row
- b. Placed to the left of the row
- c. Totalled using Sum, Average, Minimum, and Maximum
- d. All of the above



## QUIZ 5

Row totals may be \_\_\_\_\_:

- a. Placed to the right of the row
- b. Placed to the left of the row
- c. Totalled using Sum, Average, Minimum, and Maximum
- d. All of the above



The correct answer is **d.**

Row totals can be placed to the right of the row, which is the default, or to the left of the row. The totals can be computed as a Sum, Average, Minimum, or Maximum.

# Guided Exercises

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# Guided Exercise 1—Problem Statement

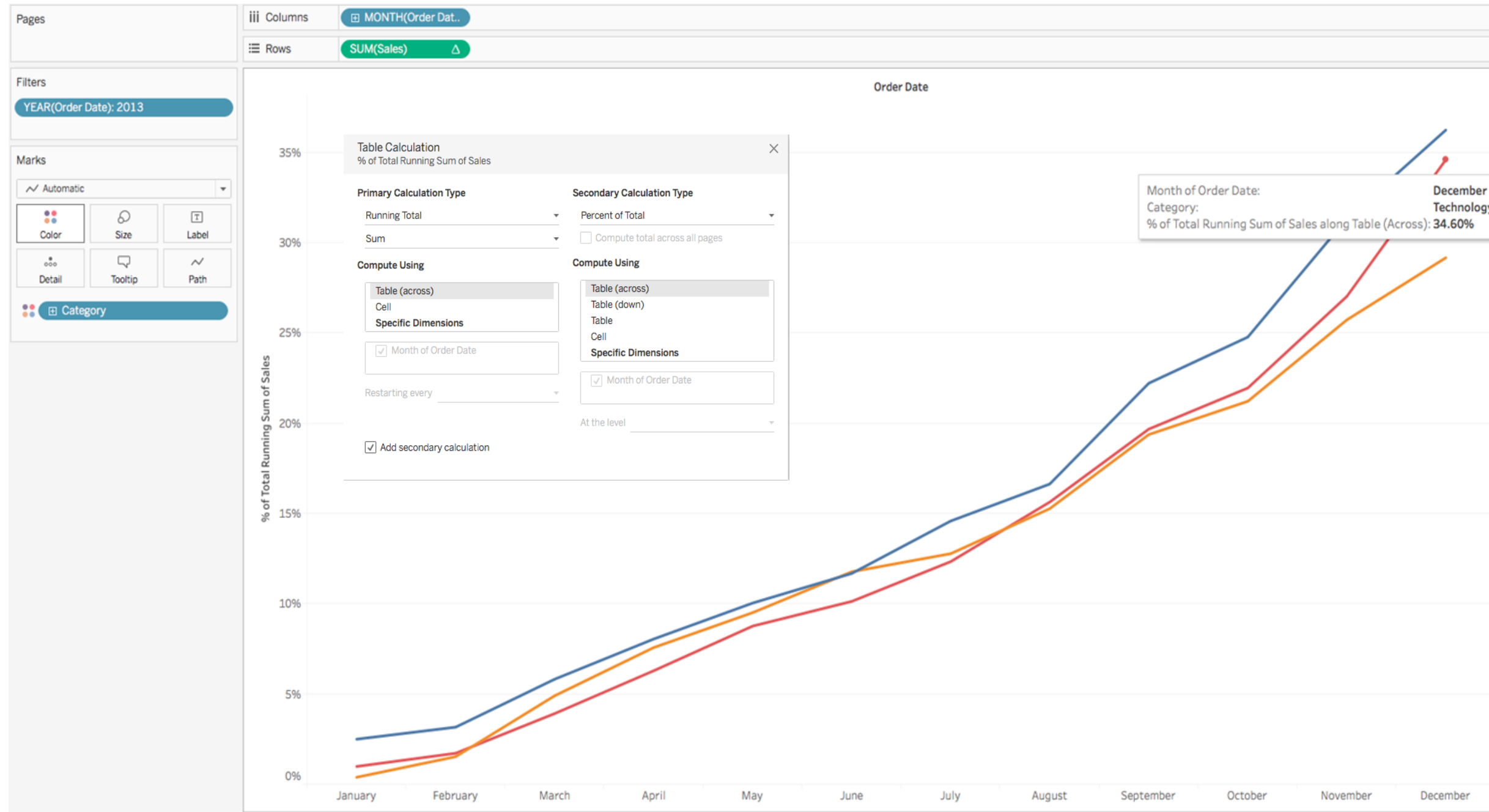
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The Directors of a retail company want to analyze the percent to total contribution of each month against the total revenue. For this, they need to analyze the percent to total of the running sum of sales across time. Create a visualization to answer the following questions:

- What was the Technology category's percentage contribution to total sales in December 2013?
- In which month did the company cross 50% of the total sales?

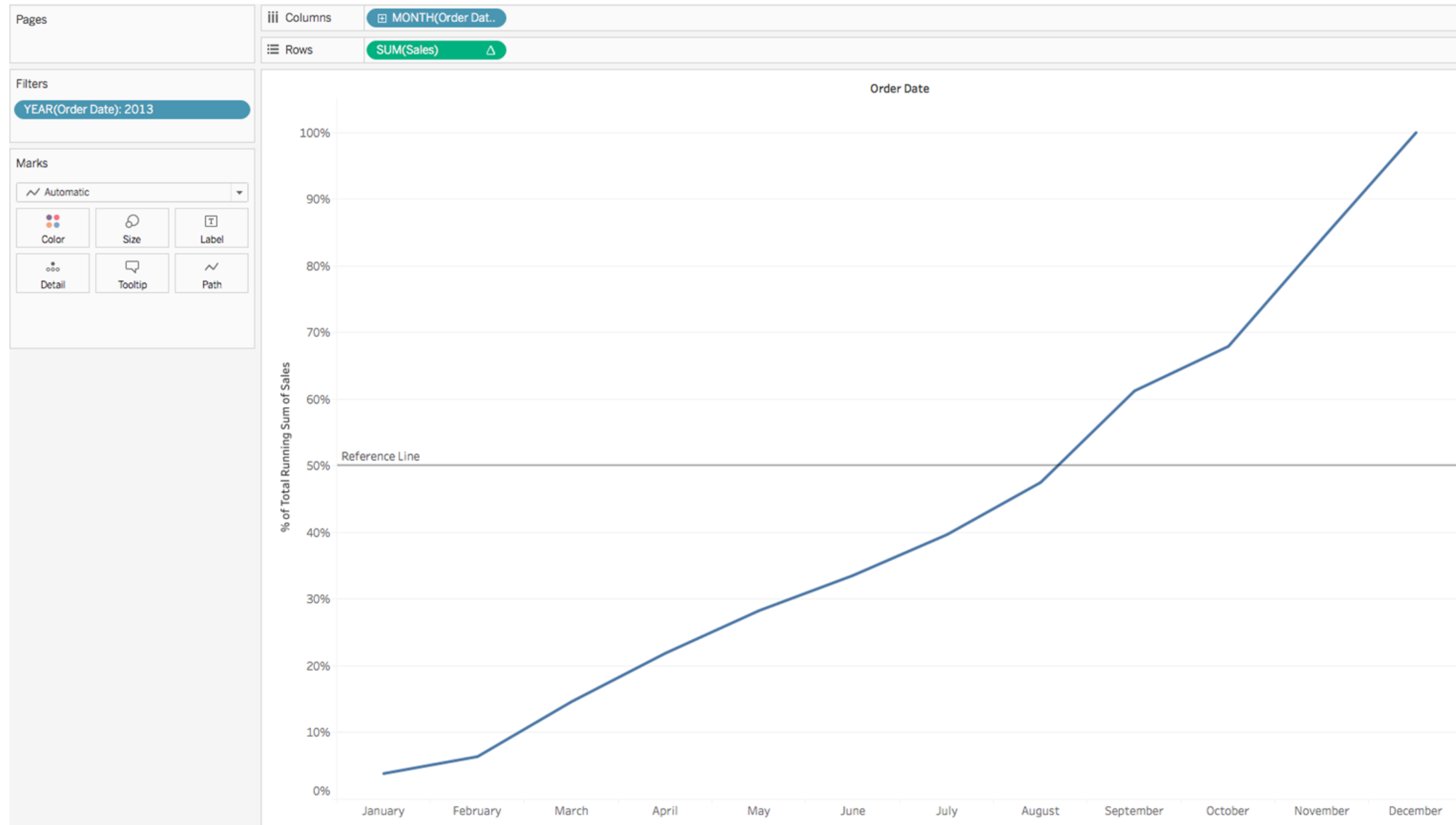
# Guided Exercise 1—Solution

The Technology Category's contribution to the running sum of sales was 34.60% in December.



# Guided Exercise 1—Solution

The company achieved 50% of sales for the year in August



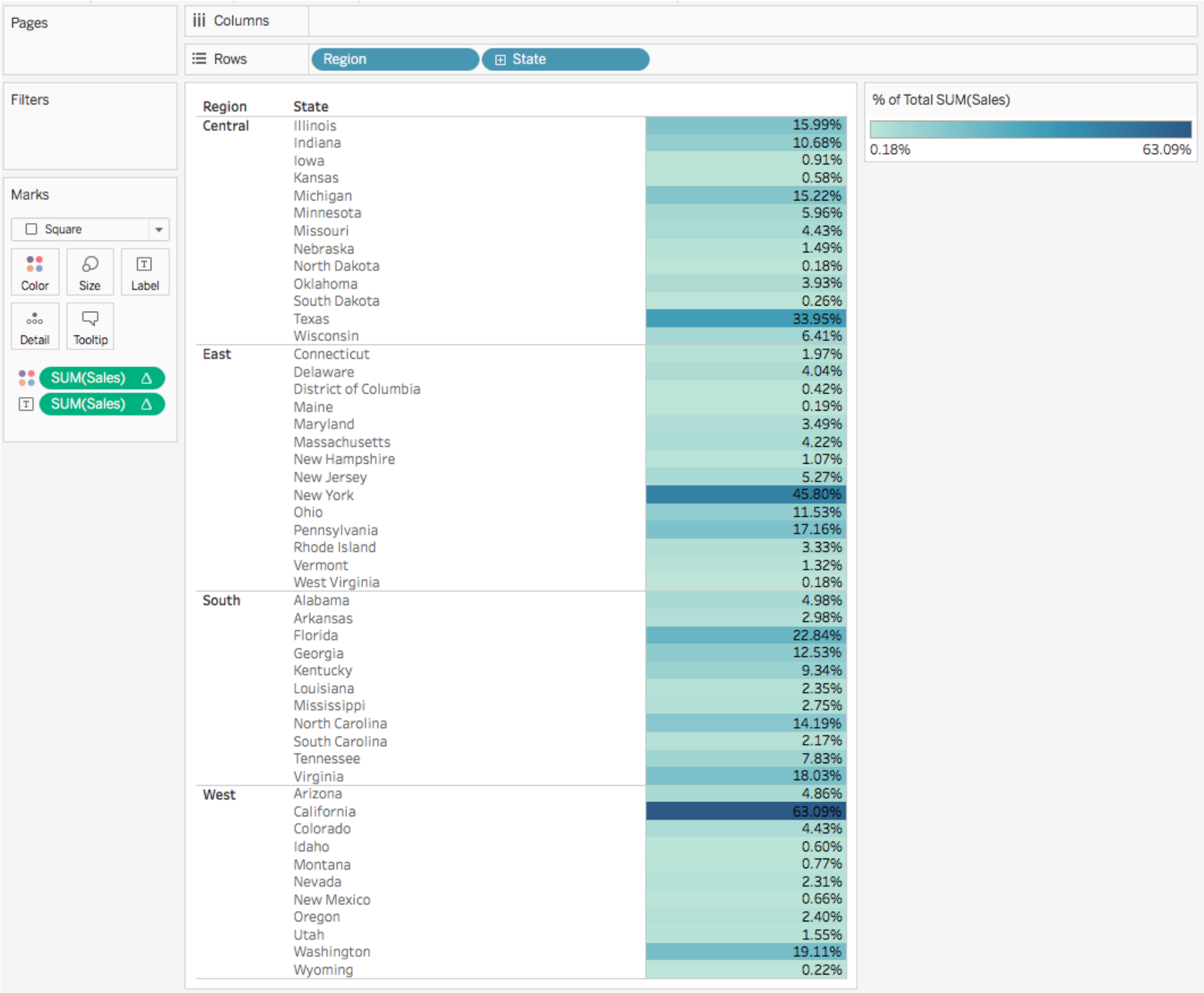


## Guided Exercise 2—Problem Statement

Mark Anthony, the regional manager of a retail chain, needs to strategize a reward program scheme for regions with high performance. For this, he needs to analyze each state's sales contribution to the total sales within its respective region. Create a visualization to arrive at the answers to the following questions:

- Which is the highest performing state in the Central Region?
  - What is New York and New Jersey's contribution to the total sales of the East region?
- (Hint - Create a group for New York and New Jersey)

# Guided Exercise 2—Solution



The State with the highest percentage of sales within its respective region is Texas, with 34% of sales in the Central region.

# Guided Exercise 2—Solution

Columns		
Rows		
Region		
State (group)		
Region	State (group)	% of Total SUM(Sales)
Central	Illinois	15.99%
	Indiana	10.68%
	Iowa	0.91%
	Kansas	0.58%
	Michigan	15.22%
	Minnesota	5.96%
	Missouri	4.43%
	Nebraska	1.49%
	North Dakota	0.18%
	Oklahoma	3.93%
	South Dakota	0.26%
	Texas	33.95%
	Wisconsin	6.41%
	Wyoming	0.22%
East	Connecticut	1.97%
	Delaware	4.04%
	District of Columbia	0.42%
	Maine	0.19%
	Maryland	3.49%
	Massachusetts	4.22%
	New Hampshire	1.07%
	New Jersey & New York	51.07%
	Ohio	11.53%
	Pennsylvania	17.16%
	Rhode Island	3.33%
	Vermont	1.32%
	West Virginia	0.18%
	Alabama	4.98%
South	Arkansas	2.98%
	Florida	22.84%
	Georgia	12.53%
	Kentucky	9.34%
	Louisiana	2.35%
	Mississippi	2.75%
	North Carolina	14.19%
	South Carolina	2.17%
	Tennessee	7.83%
	Virginia	18.03%
	Arizona	4.86%
	California	63.09%
	Colorado	4.43%
	Idaho	0.60%
West	Montana	0.77%
	Nevada	2.31%
	New Mexico	0.66%
	Oregon	2.40%
	Utah	1.55%
	Washington	19.11%
	Wyoming	0.22%

When combined, New York and New Jersey account for 51% of the sales in the East region.



# Key Takeaways

- Calculated fields are formulas that the user creates using standard functions and operators and existing fields from your dataset.
- Quick Table Calculations are an efficient way to perform calculations on your data within the worksheet.
- Aggregation functions are mathematical functions used to produce aggregated data.
- Grand totals and subtotals can be added to your worksheet quickly and easily.

**This concludes “Performing Calculations in Tableau.”**