PROGRAM :4

Types of calculations

To create calculated fields using calculations. There are three main types of calculations you can use to create calculated fields in Tableau:

- **Basic calculations** - Basic calculations allow you to transform values or members at the data source level of detail (a row-level calculation) or at the visualization level of detail (an aggregate calculation).
- **Level of Detail (LOD) expressions** - Just like basic calculations, LOD calculations allow you to compute values at the data source level and the visualization level. However, LOD calculations give you even more control on the level of granularity you want to compute. They can be performed at a more granular level (INCLUDE), a less granular level (EXCLUDE), or an entirely independent level (FIXED) with respect to the granularity of the visualization.
- **Table calculations** - Table calculations allow you to transform values at the level of detail of the visualization only.

Create a calculated field

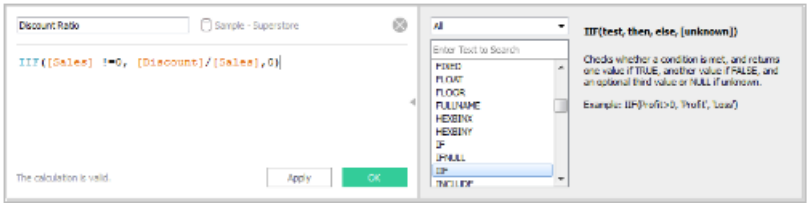
Note: The example in this article uses the **Sample-Superstore** data source that comes with Tableau Desktop. To follow along with the steps in this article, connect to the **Sample-Superstore** saved data source and navigate to **Sheet 1**.

1. In Tableau, select **Analysis** > **Create Calculated Field**.
2. In the Calculation Editor that opens, do the following:
    - Enter a name for the calculated field. In this example, the field is called, **Discount Ratio**.
    - Enter a formula. This example uses the following formula:

      ```
      IIF([Sales] !=0, [Discount]/[Sales],0)
      ```

      This formula checks if sales is not equal to zero. If true, it returns the discount ratio (Discount/Sales); if false, it returns zero.

Tip: To see a list of available functions, click the triangle icon on the right-side of the Calculation Editor.

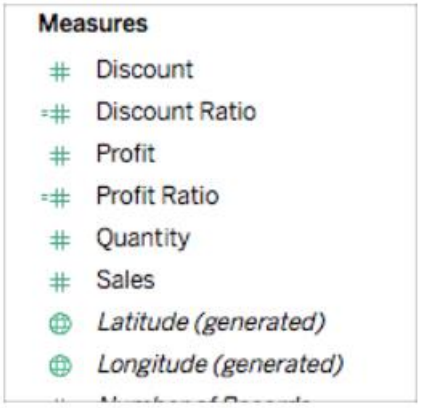


Each function includes syntax, a description, and an example for your reference.

Double-click a function in the list to add it to the formula.

When finished, click **OK**.

The new calculated field is added to Measures in the Data pane because it returns a number. An equal sign (=) appears next to the data type icon. All calculated fields have equal signs (=) next to them in the **Data** pane.

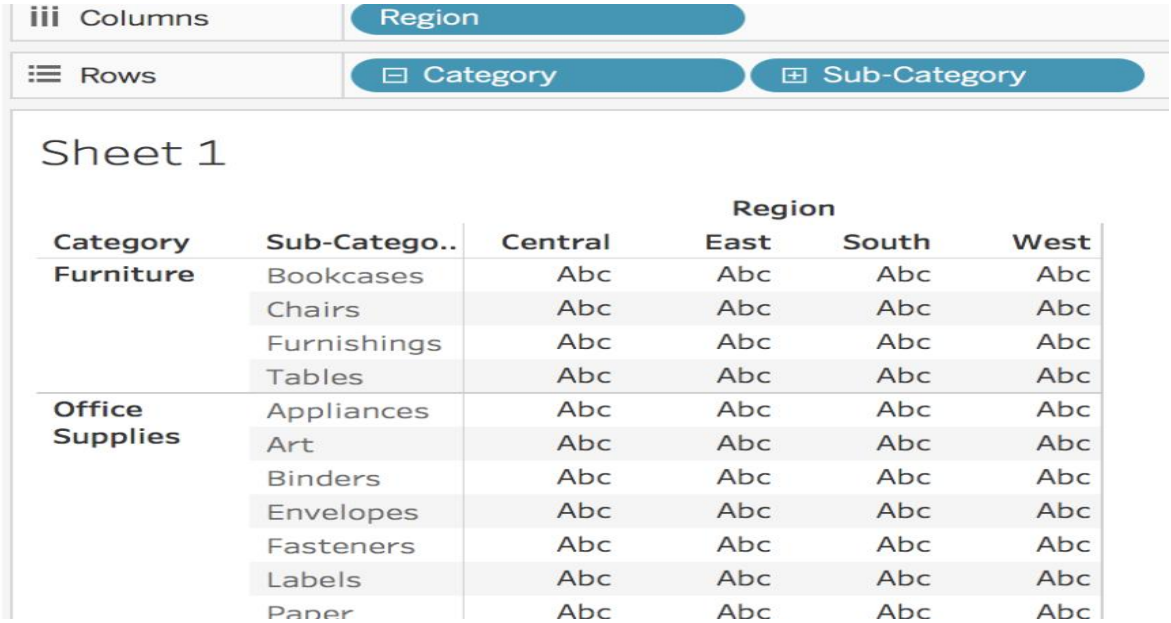


Use a calculated field in the view

Step 1: Build the view

1. From Dimensions, drag **Region** to the **Columns** shelf.
2. From Dimensions, drag **Category** to the **Rows** shelf.
3. On the **Rows** shelf, click the plus icon (+) on the **Category** field to drill-down to Subcategory.

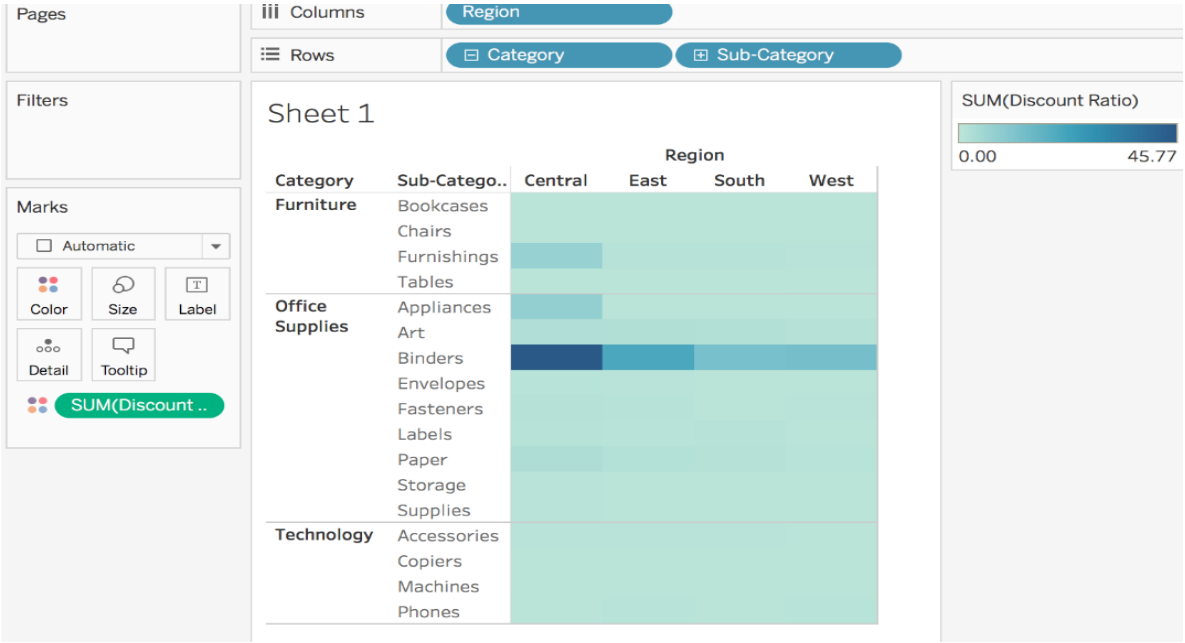
   The view updates to look like this:



Step 2: Add the calculated field to the view

1. From Measures, drag **Discount Ratio** to **Color** on the Marks card.

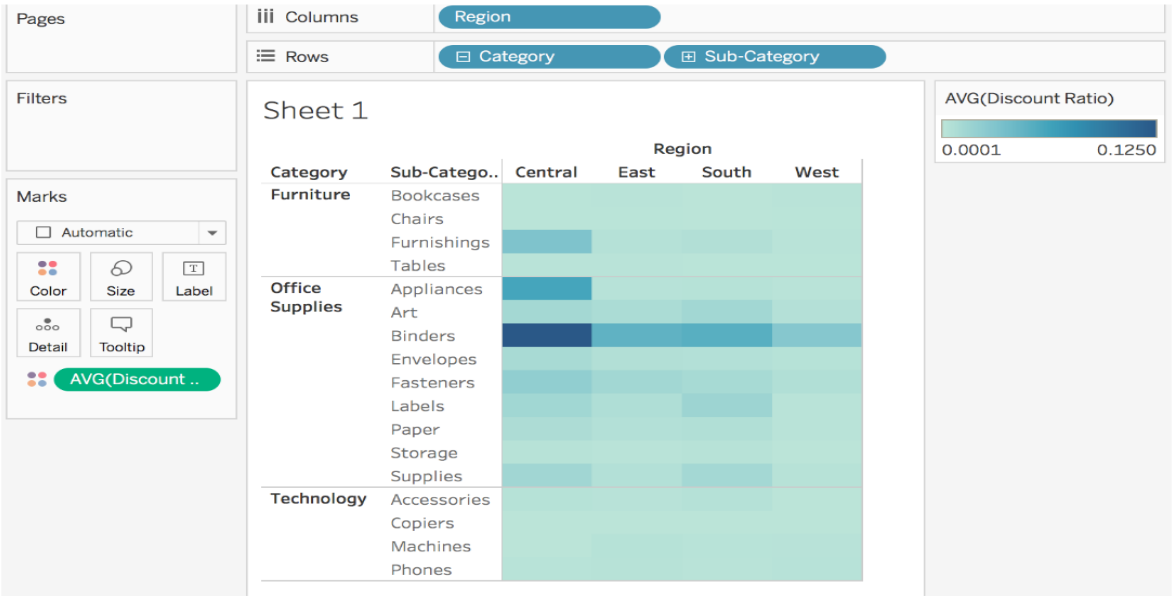
   The view updates to highlight table.



1. You can see that Binders are heavily discounted in the Central region. Notice that Discount Ratio is automatically aggregated as a sum.

2. On the Rows shelf, right-click **SUM(Discount Ratio)** and select **Measure (Sum)** > **Average**.

   The view updates with the average of discount ratio shown.



Edit a Calculated Field

If at any time you need to change a calculation, you can edit the calculated field and it will update across your entire workbook.

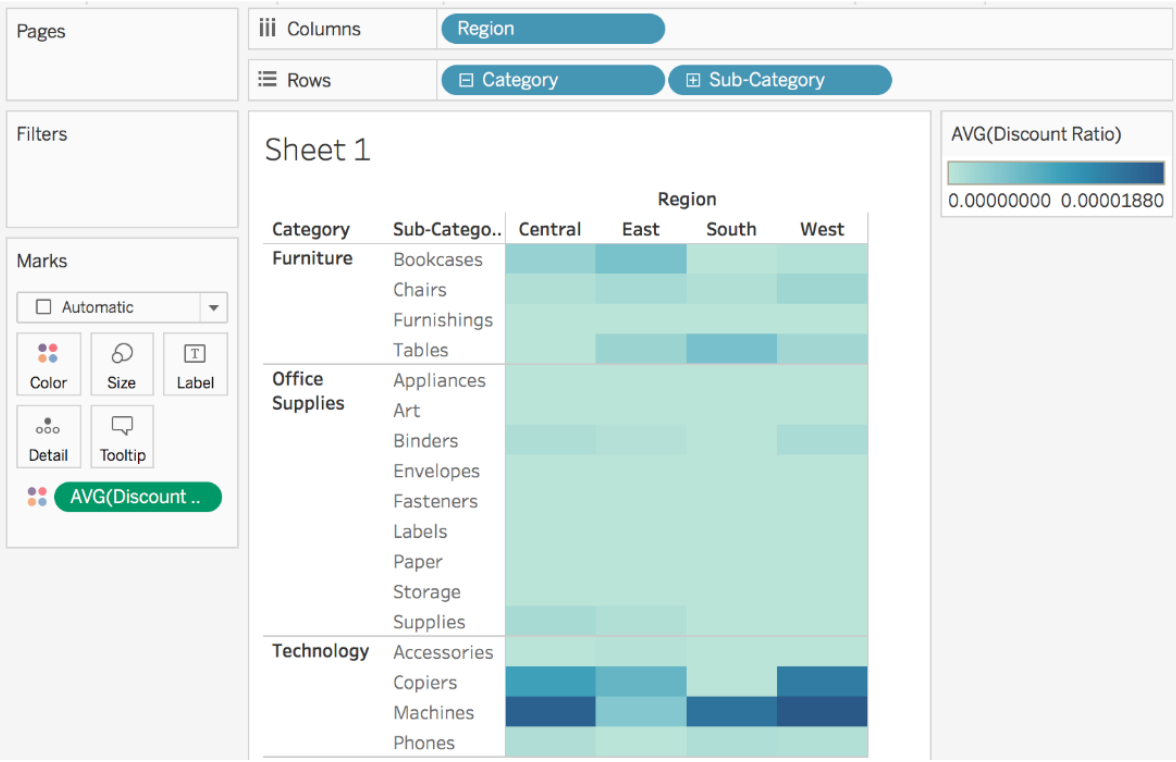
To edit a calculated field:

1. In the **Data** pane, right-click the calculated field and select **Edit**.
2. In the Calculation Editor that opens, you can do the following:
    - Edit the name of the calculated field.
    - Update the formula.

      For this example, the formula is changed to return a discount ratio for orders over 2000 USD in sales:

      ```
      IIF([Sales] > 2000, [Discount]/[Sales],0)
      ```
3. Click **OK**.

   The view updates to reflect the changes automatically. You *do not* need to re-add the updated calculated field to the view.


Pages
Columns
Region
Rows
Category
Sub-Category
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
AVG(Discount ..
Sheet 1
Region
Category
Sub-Catego..
Central
East
South
West
Furniture
Bookcases
Chairs
Furnishings
Tables
Office Supplies
Appliances
Art
Binders
Envelopes
Fasteners
Labels
Paper
Storage
Supplies
Technology
Accessories
Copiers
Machines
Phones
AVG(Discount Ratio)
0.00000000
0.00001880

operator is a symbol that tells the compiler to perform specific mathematical or logical manipulations. Tableau has a number of operators used to create calculated fields and formulas.

Following are the details of the operators that are available and the order (precedence) of operations.

Types of Operator

- General Operators
- Arithmetic Operators
- Relational Operators
- Logical Operators

General Operators

Following table shows the general operators supported by Tableau. These operators act on numeric, character, and date data types.

Operator	Description	Example
+(addition)	Adds two numbers. Concatenates two strings. Adds days to dates.	7 + 3 Profit + Sales 'abc' + 'def' = 'abcdef' #April 15, 2004# + 15 = #April 30, 2004#
– (subtraction)	Subtracts two numbers. Subtracts days from dates.	-(7+3) = -10 #April 16, 2004# - 15 = #April 1, 2004#

Arithmetic Operators

Following table shows the arithmetic operators supported by Tableau. These operators act only on numeric data types.

Operator	Description	Example
*(Multiplication)	Numeric multiplication	23*2 = 46
/(Division)	Numeric division	45/2 = 22.5
%(modulo)	Reminder of numeric division	13 % 2 = 1
^(power)	Raised to the power	2^3 = 8

Comparison Operators

Following table lists the comparison operators supported by Tableau. These operators are used in expressions. Each operator compares two numbers, dates, or strings and returns a Boolean (TRUE or FALSE). Booleans themselves, however, cannot be compared using these operators.

Operator	Description	Example
= = or = (Equal to)	Compares two numbers or two strings or two dates to be equal. Returns the Boolean value TRUE if they are, else returns false.	'Hello' = 'Hello' 5 = 15/ 3
!= or <> (Not equal to)	Compares two numbers or two strings or two dates to be unequal. Returns the Boolean value TRUE if they are, else returns false.	'Good' <> 'Bad' 18 != 37 / 2
> (Greater than)	Compares two numbers or two strings or two dates where the first argument is greater than second. Returns the boolean value TRUE if it is the case, else returns false.	[Profit] > 20000 [Category] > 'Q' [Ship date] > #April 1, 2004#
< (Less than)	Compares two numbers or two strings or two dates where the first argument is smaller than second. Returns the boolean value TRUE if it is the case, else returns false.	[Profit] < 20000 [Category] < 'Q' [Ship date] < #April 1, 2004#

Logical Operators

Following table shows the logical operators supported by Tableau. These operators are used in expressions whose result is a Boolean giving the output as TRUE or FALSE.

Operator	Description	Example
AND	If the expressions or Boolean values present on both sides of AND operator is evaluated to be TRUE, then the result is TRUE. Else the result is FALSE.	[Ship Date] > #April 1, 2012# AND [Profit] > 10000
OR	If any one or both of the expressions or Boolean values present on both sides of AND operator is evaluated to be TRUE, then the result is TRUE. Else the result is FALSE.	[Ship Date] > #April 1, 2012# OR [Profit] > 10000
NOT	This operator negates the Boolean value of the expression present after it.	NOT [Ship Date] > #April 1, 2012#

Operator Precedence

The following table describes the order in which operators are evaluated. The top row has the highest precedence. Operators on the same row have the same precedence. If two operators have the same precedence, they are evaluated from left to right in the formula. Also parentheses can be used. The inner parentheses are evaluated before the outer parentheses.

Precedence	Operator
1	–(negate)
2	^(power)
3	*, /, %
4	+, –
5	==, >, <, >=, <=, !=
6	NOT
7	AND
8	OR

FUNCTIONS:

Any data analysis involves a lot of calculations. In Tableau, the calculation editor is used to apply calculations to the fields being analyzed. Tableau has a number of inbuilt functions which help in creating expressions for complex calculations.

Following are the description of different categories of functions.

- Number Functions
- String Functions
- Date Functions
- Logical Functions

- Aggregate Functions

Number Functions

These are the functions used for numeric calculations. They only take numbers as inputs. Following are some examples of important number functions.

Function	Description	Example
CEILING (number)	Rounds a number to the nearest integer of equal or greater value.	CEILING(2.145) = 3
POWER (number, power)	Raises the number to the specified power.	POWER(5,3) = 125
ROUND (number, [decimals])	Rounds the numbers to a specified number of digits.	ROUND(3.14152,2) = 3.14

String Functions

String Functions are used for string manipulation. Following are some important string functions with examples

Function	Description	Example
LEN (string)	Returns the length of the string.	LEN("Tableau") = 7
LTRIM (string)	Returns the string with any leading spaces removed.	LTRIM(" Tableau ") = "Tableau"
REPLACE (string, substring, replacement)	Searches the string for substring and replaces it with a replacement. If the substring is not found, the string is not changed.	REPLACE("GreenBlueGreen", "Blue", "Red") = "GreenRedGreen"
UPPER (string)	Returns string, with all characters uppercase.	UPPER("Tableau") = "TABLEAU"

Date Functions

Tableau has a variety of date functions to carry out calculations involving dates. All the date functions use the **date_part** which is a string indicating the part of the date such as - month, day, or year. Following table lists some examples of important date functions.

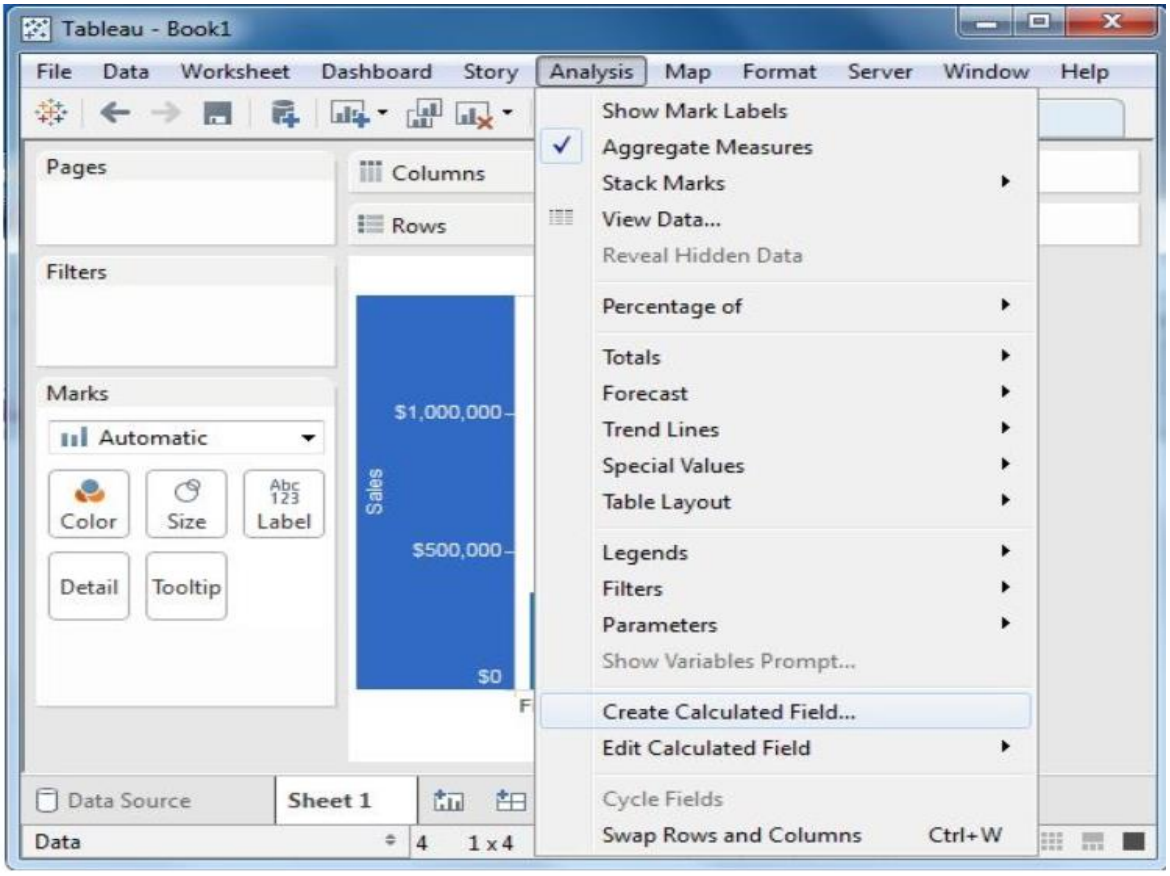
Function	Description	Example
DATEADD (date_part, increment, date)	Returns an increment added to the date. The type of increment is specified in **date_part**.	DATEADD ('month', 3, #2004-04-15#) = 2004-0715 12:00:00 AM
DATENAME (date_part, date, [start_of_week])	Returns **date_part** of date as a string. The **start_of_week** parameter is optional.	DATENAME('month', #200404-15#) = "April"
DAY (date)	Returns the day of the given date as an integer.	DAY(#2004-04-12#) = 12
NOW( )	Returns the current date and time.	NOW( ) = 2004-04-15 1:08:21 PM

Tableau - Numeric Calculations

Numeric calculations in Tableau are done using a wide range of inbuilt functions available in the formula editor.we will see how to apply calculations to the fields. The calculations can be as simple as subtracting the values of two fields or applying an aggregate function to a single field.

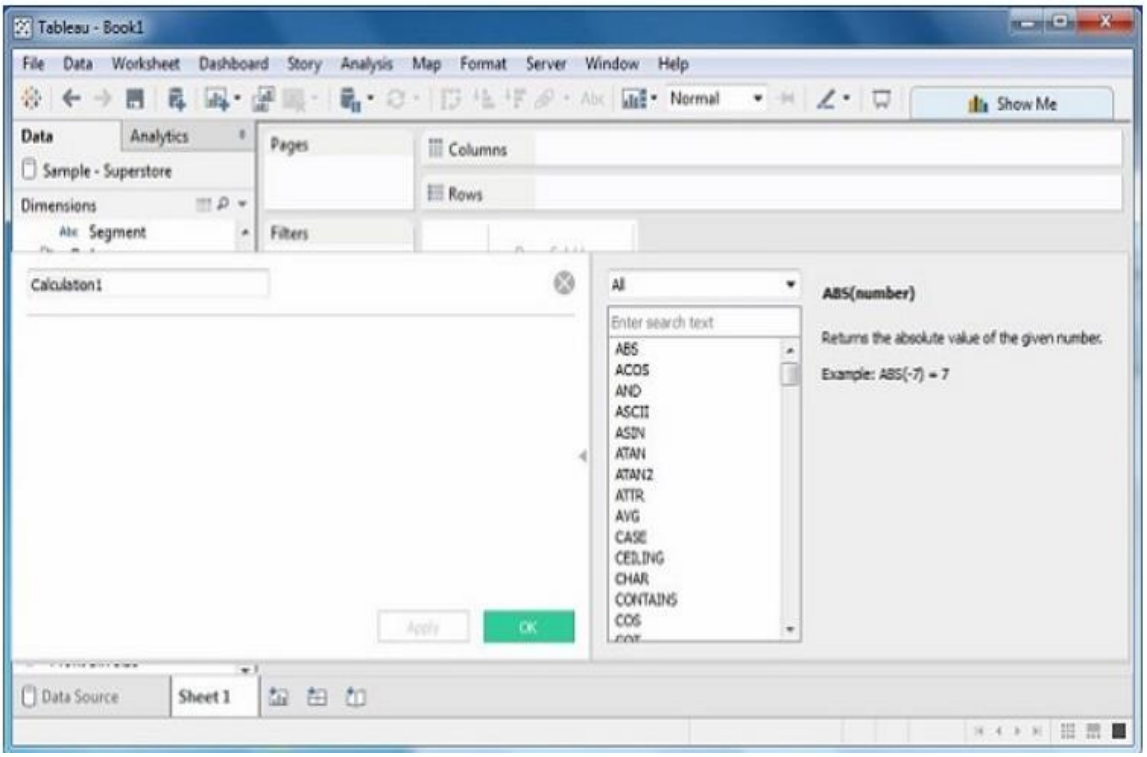
Create Calculated Field

While connected to Sample-superstore, go to the Analysis menu and click 'Create Calculated Field', as shown in the following screenshot.



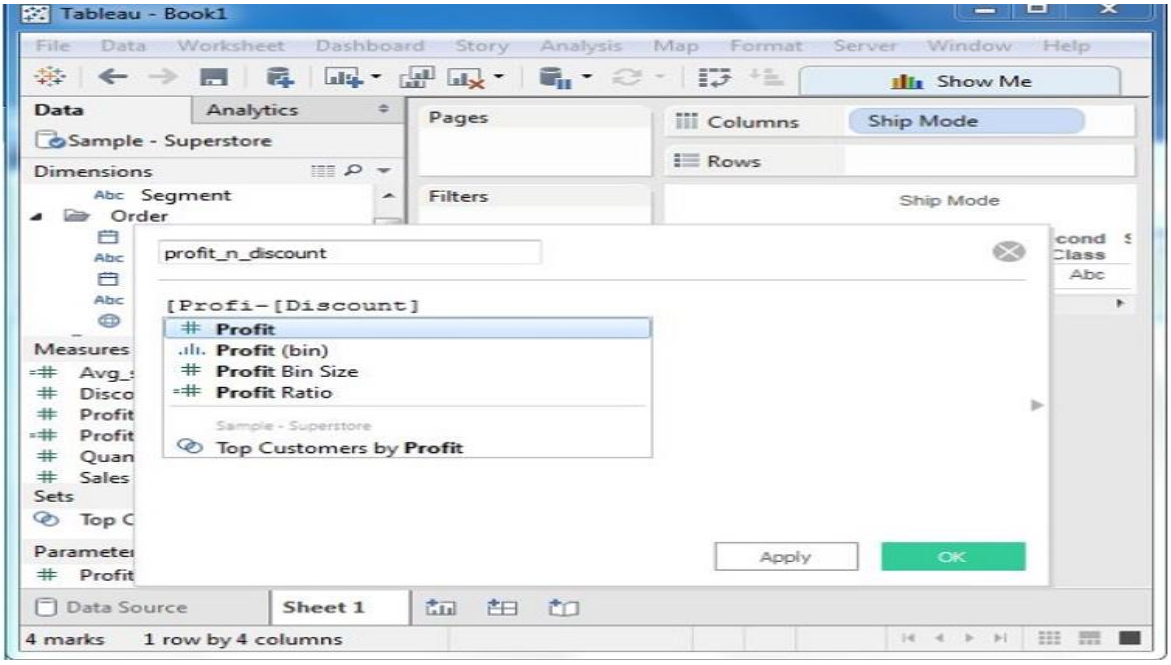
Calculation Editor

The above step opens a calculation editor which lists all the functions that is available in Tableau. You can change the dropdown value and see only the functions related to numbers



Create a Formula

To study the difference between profit and discount for different shipping mode of the products, create a formula subtracting the discount from the profit as shown in the following screenshot. Also, name this field as **profit_n_discount**.



Using the Calculated Field

The above calculated field can be used in the view by dragging it to the Rows shelf as shown in the following screenshot. It produces a bar chart showing the difference between profit and discount for different shipping modes.

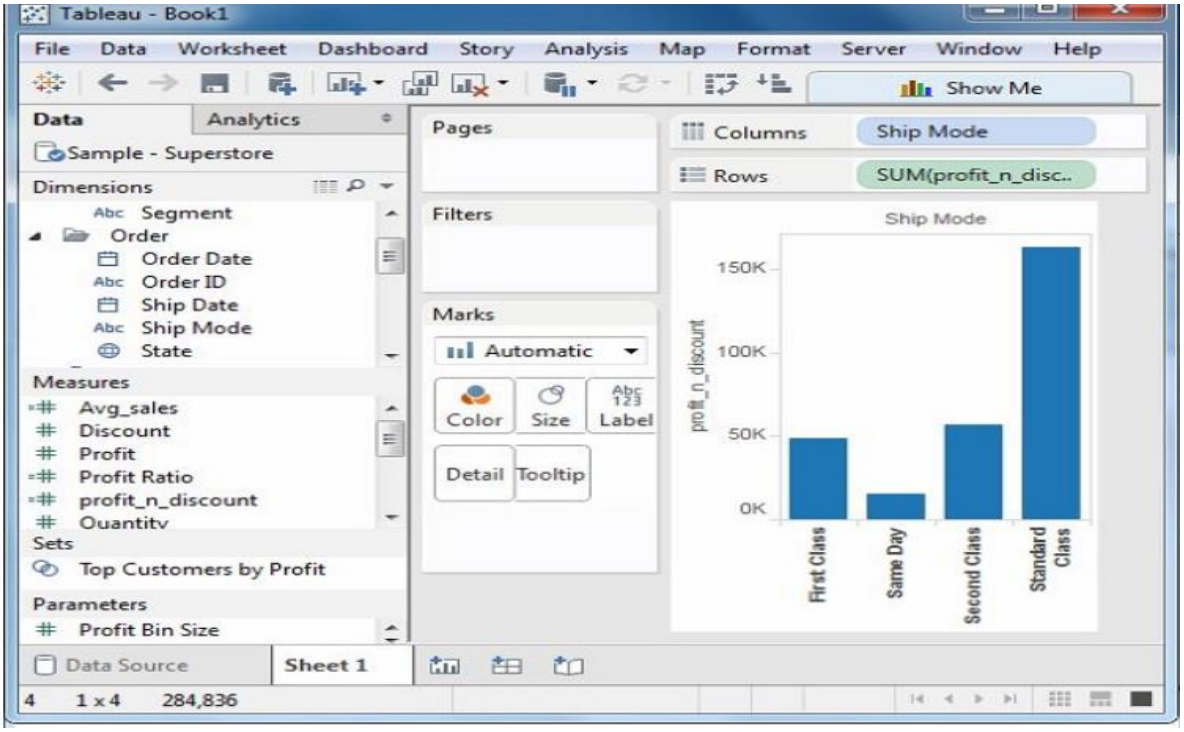
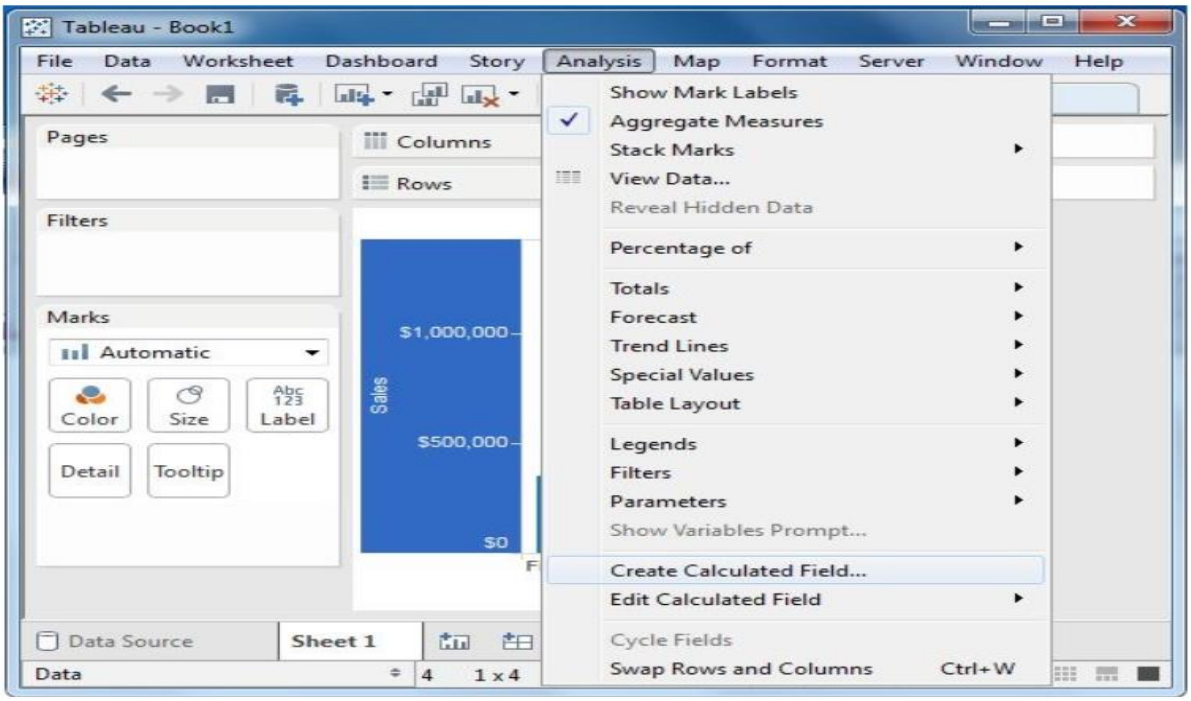


Tableau - String Calculations

Tableau has many inbuilt string functions, which can be used to do string manipulations such as - comparing, concatenating, replacing few characters from a string, etc. Following are the steps to create a calculation field and use string functions in it.

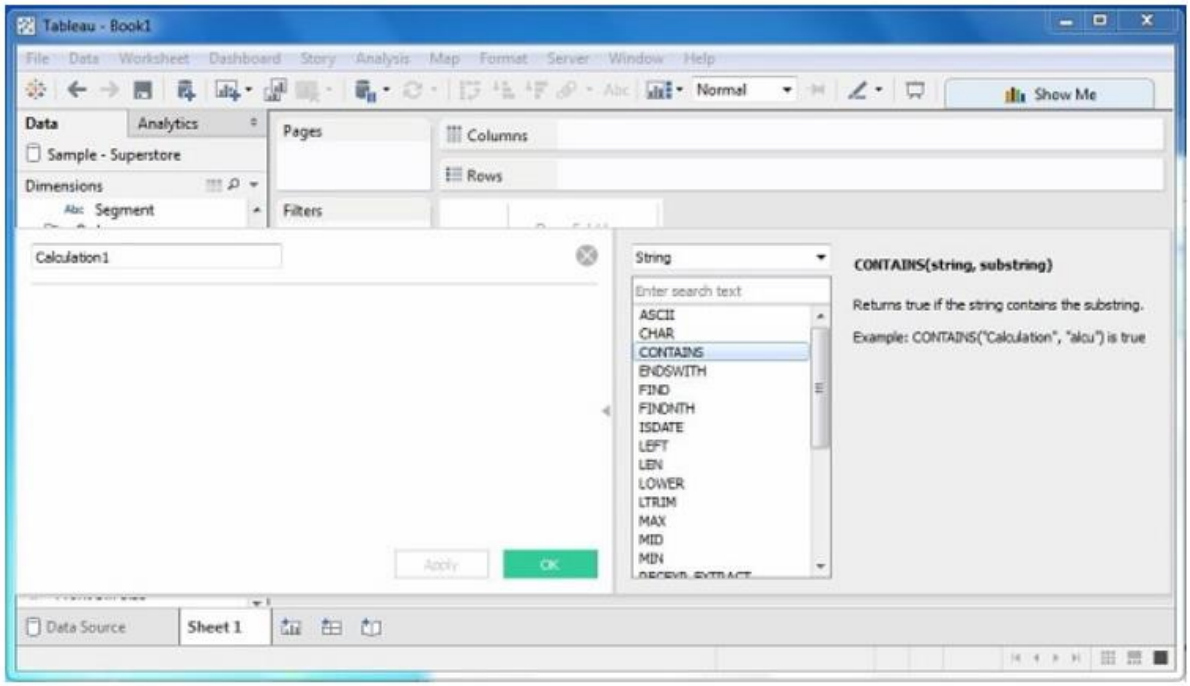
Create Calculated Field

While connected to Sample superstore, go to the Analysis menu and click ‘Create Calculated Field’ as shown in the following screenshot.



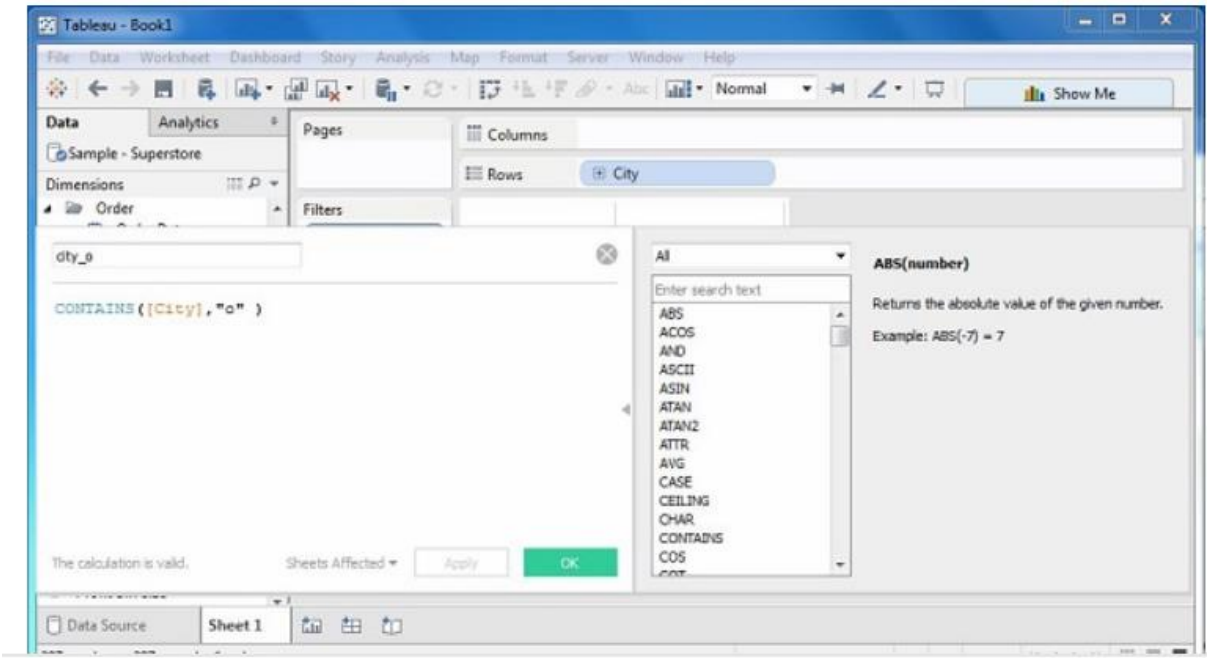
Calculation Editor

The above step opens a calculation editor which lists all the functions that is available in Tableau. You can change the dropdown value and see only the functions related to strings.



Create a Formula

Consider you want to find out the sales in the cities, which contain the letter “o”. For this, create the formula as shown in the following screenshot.



Using the Calculated Field

Now, to see the created field in action, you can drag it to the Rows shelf and drag the Sales field to the Columns shelf. The following screenshot shows the Sales values.

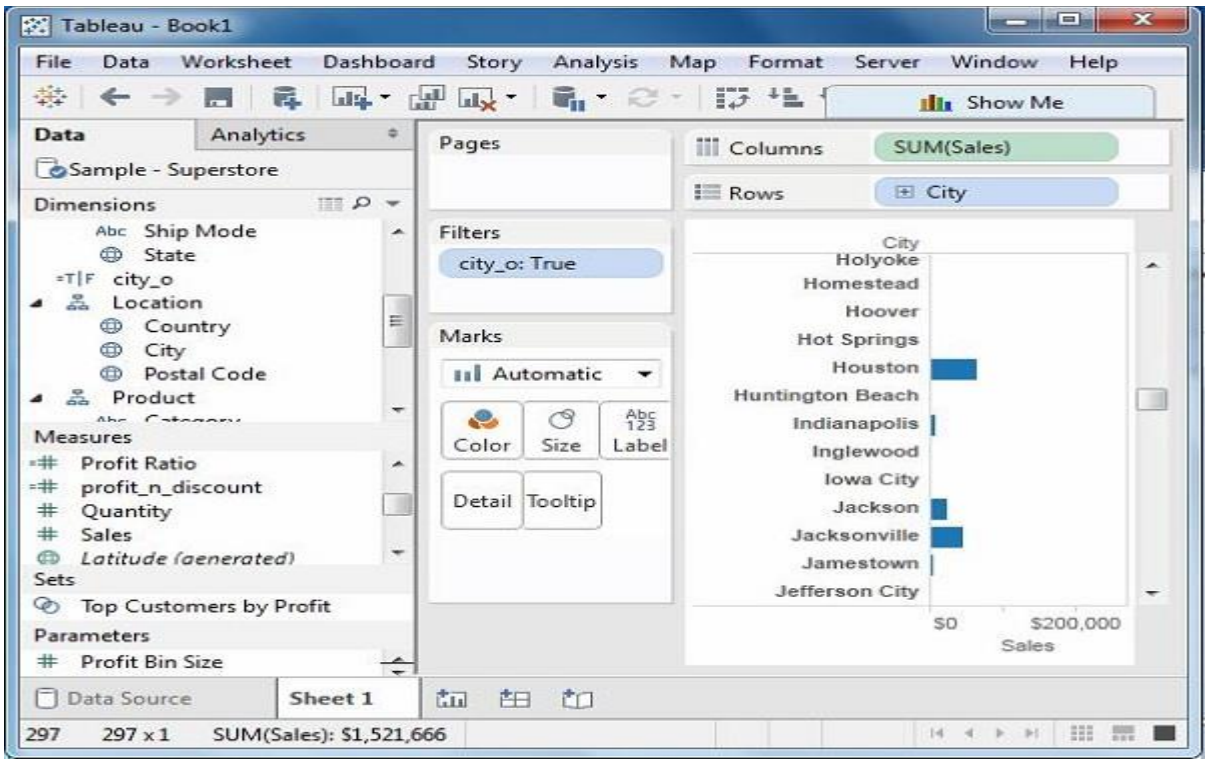


Tableau - Date Calculations

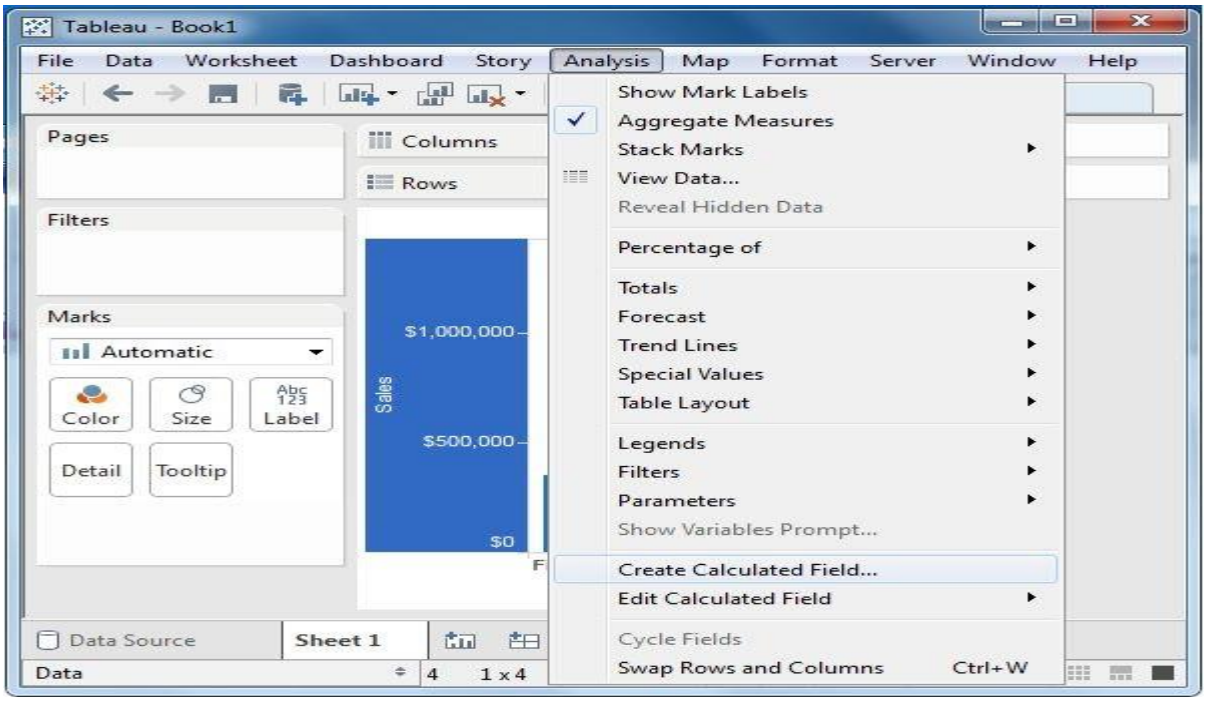
Dates are one of the key fields which is extensively used in most of the data analysis scenarios. Hence, Tableau provides a large number of inbuilt functions

involving dates. You can carry out simple date manipulations such as adding or subtracting days from a date.

Following are the steps to create a calculation field and use date functions in it.

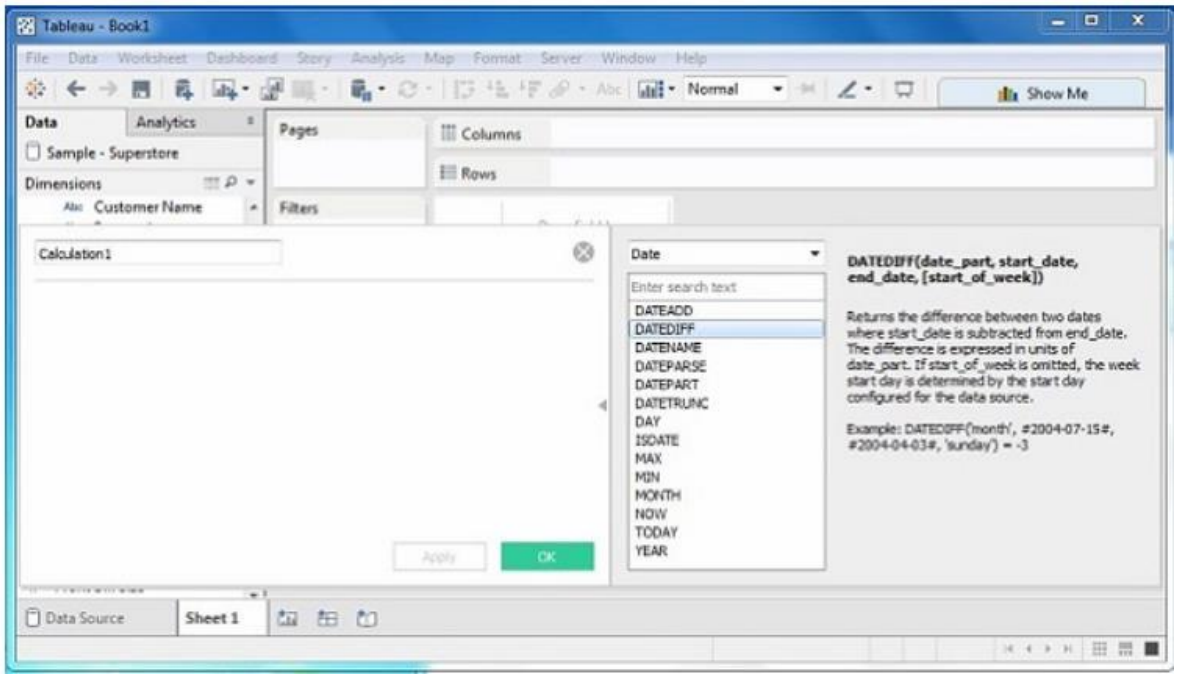
Create Calculated Field

While connected to Sample superstore, go to the Analysis menu and click 'Create Calculated Field', as shown in the following screenshot.



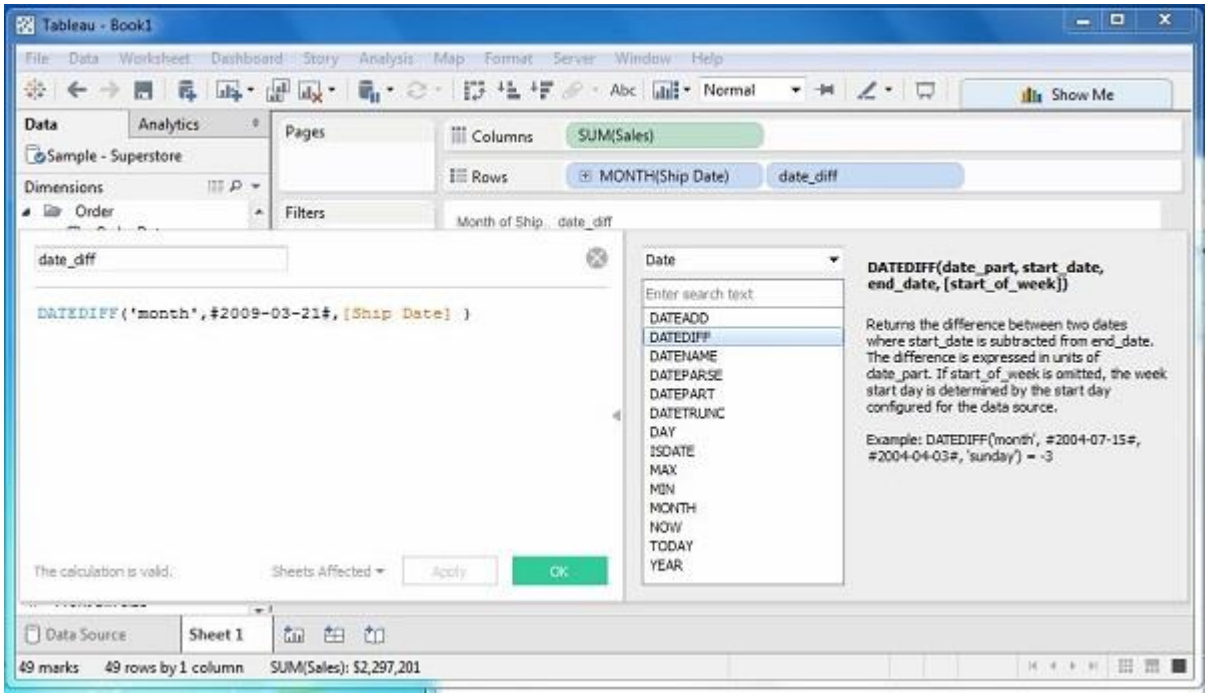
Calculation Editor

The above step opens a calculation editor, which lists all the functions available in Tableau. You can change the dropdown value and see only the functions related to Date.



Create a Formula

Now, find out the sales volume along with the difference in the date of sales in months from 21st March 2009. For this, create the formula as shown in the following screenshot.



Using the Calculated Field

Now to see the created field in action, you can drag it to the Rows shelf and drag the Sales field to the Columns shelf. Also drag the ship Date with months. The following screenshot shows the Sales values.

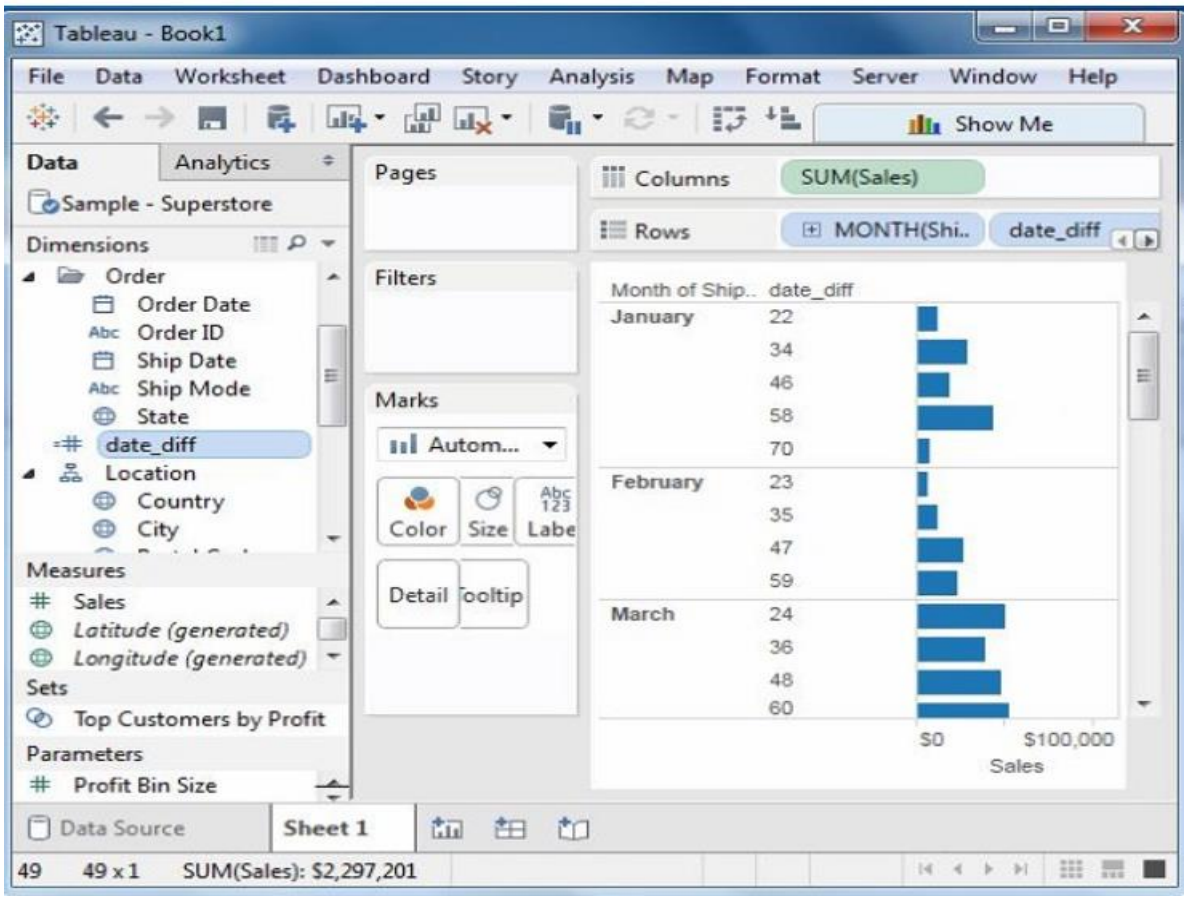


Tableau - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Show Me
Data Analytics
Sample - Superstore
Dimensions
Order
Order Date
Order ID
Ship Date
Ship Mode
State
date_diff
Location
Country
City
Measures
Sales
Latitude (generated)
Longitude (generated)
Sets
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Parameters
Profit Bin Size
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Autom...
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Label
Detail
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Month of Ship..
date_diff
January
22
34
46
58
70
February
23
35
47
59
March
24
36
48
60
$0
$100,000
Sales
Data Source
Sheet 1
49
49 x 1
SUM(Sales): $2,297,201