Script for Tableau Desktop Training – May/June 2019

A. Data Connections and Data Sources
   a. Open up a blank Tableau Desktop workbook
   b. Describe the opening window
   c. Data Connections
      i. Connect to "UG_Enrollment_Sample.xls" and open
      ii. Pull the "UG_Enrollment_Sample" table into Data Source window
      iii. Describe the Data Source page in comparison to Worksheets, Dashboards and Stories
      iv. Open a blank version of each to describe the layout hierarchy
      v. Go back to Data Source tab, and explain the difference between Live and Extract connections
         1. When to use an extract vs a live connection?
   d. Modify Data Connections
      i. Unions
         1. Go to worksheet (Sheet 1)
         2. Describe the general layout the Sheet window > Dimensions, Measures, Columns, Rows, Filters, Marks
         3. Drag "Term Code Key" to Rows.
            a. Explain why Tableau automatically tries to create a bar chart with it.
            b. Drag the "Term Code Key" pill off Rows.
            c. Convert "Term Code Key" to a Dimension (right-click Convert to Dimension).
            d. Change the data type to a String (right-click Change Data Type > String).
            e. Drag it to the Rows shelf again. Show how Tableau now displays it as rows in a tabular format.
            f. Pull in "Counter" and "Number of Records" to Text to show what the table contains. Describe the difference between the 2 fields. (Drag "Number of Records" on top of the column to get the columns to line up side by side.)
         4. Click on the "View Data" button next to Dimensions to show a preview of the table. Show that there are 3,969 rows.
         5. Go back to Data Source tab, and drag the "UG_Enrollment_SampleUpdate" table to the "Drag table to union" dialog box
         6. Go back to Sheet 1 and display the 201910 row in the table. That is a simple union. Open the "View Data" box to see that there are now 4,870 rows.
      ii. Joins
         1. Go back to Data Source tab, click on Add and add the "Course_Registration_Sample" table. Change the automatic join created by Tableau to a left join. Make sure Rand ID is connected to Rand ID in the Join details window.

2. Go back to Sheet 1 and show what happened to the table. The data rows are multiplied because the unit of analysis is now course CRNs. The "View data" window now shows 10,000 rows.
3. Go back to Data Source tab, and remove the join, then remove the "Course_Registration_Sample" from the Data Connection
4. Go to Data > New Data Source and browse to the "Course_Registration_Sample" table and open.
5. Click on Add and add the "Course_Details_Sample" table to the same connection. Change the join to a left join. Make sure that Ssvenrl Crn is connected to SSVENRL CRN in the Join details window. This is how a join works. You can join tables from multiple sources within the same data connection as long as there is a common field between the two tables.
6. Click on Add again and add the "Employees_Sample" table. Show that Tableau is connecting the wrong Rand ID's in the Join details window. Fix the join by changing the Data Source on the left to "Courses_Sample" > "Faculty_RandID" and assign that to the "RandID" in the "Employees_Sample" table

iii. Blends
1. Click back on Sheet 1 and point out how there are now 2 Data Sources at the top. Click on the "CRN_Assignment" data source and view the Dimension and Measures. Show how there are multiple tables now represented in this joined data source.
2. Click on the link icon next to "Rand ID" under "CRN_Assignment". Go to Data > Edit Relationships to check the relationship is setup properly.
3. Drag to the "Number of Records" field to the table. Note that the secondary data source is now labeled with an orange check mark. This is a data blend. Note the difference in magnitude between the two "Number of Records" columns.

iv. Review the concept of joins, blends and unions
1. Any questions before moving on?

e. Review the difference between data connections and data sources
f. Updating data sources and extracts
i. Updating live data connection
1. Browse to the original sample Excel table and open. Add 5 news rows to the SampleUpdate tab by copying the last 5 rows of data. Save file.
2. Go back to Sheet 1, add Column Grand Totals (Analysis > Totals > Show Column Grand Totals) and confirm that there are 4,870 student records.
3. With the Enrollment data source highlighted, go back to Data Source tab. Go to Data > Refresh Data Source (Note: If not on the right data source when going back to the Data Source tab, click the dropdown arrow at the top next to the database symbol and switch to the "UG_Enrollment_Sample" data source.)
4. Go back to Sheet 1 and show that the table has been updated and now shows 4,875 records.

ii. Updating a data extract
1. What about creating an extract? Click on the CRN_Assignment data source and go to the Data Source tab.

2. Click on Extract. Show the Edit options.
    a. Single table vs Multiple tables Extract. Explain the difference. Choose Single table.
    b. Filter. Select Add, choose Faculty College, and select all options but Null to remove College=Null from the Extract.
    c. Describe the Aggregation, Number of Rows, History and Hide All Unused Fields options. Remove the Filter. Select OK.
3. Explain that the Extract has not been created yet. Click back on Sheet 1. When prompted to save the .hyper file, save as is in the Test Data folder. Processing Request > Executing query.
4. Click on a new worksheet (Sheet 2). Click on the CRN_Assignment data source. Drag "Faculty College" to the Rows. "Ssvenrl Enrl" to the Columns. Change SUM to AVG. Drag Current Faculty Rank to the Color pill. Click on Label and select "Show mark labels". Change the title at the top to "Average Enrollment by Faculty Rank by College".
5. Point out the labeling issue with CEAS and RCEAS. Show how to group them into the same category. Save the workbook at this point.
6. Go back to the original source table "Course_Details_Sample.xls" and open it. Make a copy of the "SSVENRL_ENRL" field and call it "ENRL_REVISED". Filter for all rows between 1 and 10 and add 100. Save the file.
7. Go back to the Tableau Workbook. Click back on Data Source. Click Refresh next to Extract. Go back to Sheet 2 and see that the "ENRL_REVISED" field is now added to the Measures list.
8. Duplicate Sheet 2 and call it Sheet 3. Swap out Ssvenrl Enrl in the Columns shelf with ENRL_REVISED. Compare the differences in the graphs between Sheet 2 and Sheet 3.
9. What to do when extract will not refresh?
    a. Save this topic for the intermediate group session.
    b. For beginners, let them know that we will get back to this topic if time permits later.
10. Save the workbook and close it.

B. Cleaning and Preparing Data for Analysis
    a. Open up a blank Tableau Desktop workbook
    b. Connect to the "UG_Enrollment_Sample" table
    c. Create Union with Enrollment_Sample and Enrollment_SampleUpdate
    d. Click on Sheet 1
    e. Dimensions and measures
        i. Describe the difference between dimensions and measures
        ii. Tableau tries to guess which is which but sometimes we need to make adjustments
        iii. Look at the Term Code Key. If you drag them onto Rows you get a Bar chart which is not what you want. Right click convert to Dimension. Now re-drag and you get a table.
    f. Understanding discrete vs continuous
        i. By default, numeric measures are classified as continuous and numeric dimensions are classified as discrete
        ii. Green represents a continuous measure and blue represents a discrete measure

g. Changing data type for a data field
    i. Click on the # next to Term Code Key and change it to String
h. Assign a geographic role to a data field
    i. Open a new worksheet (Sheet 2)
    ii. State and City recognized as geographic fields but Natn Desc was not.
    iii. Right-click on Natn Desc Ho and select Geographic Role > Country/Region
    iv. Drag that field into the view window
    v. Show how to correct the null values
    vi. Might need to change Background Map to Offline
i. Change default properties for a data field
    i. Click back on Sheet 1
    ii. Drag Counter or Number of Records into the table (Text pill)
    iii. Default Properties > Number Format > Remove the decimals
    iv. Add the Average Cum GPA, change default to 2 decimal places
j. Rename a field, assign an alias or calculate new field names
    i. Click on Cum GPA in the Measures pane and rename it "Cumulative GPA"
    ii. Click the back arrow to return to how it was
    iii. Right-click on the field label and select Edit Alias, rename it "Average Cumulative GPA"
        1. However, sometimes you may want to apply the same alias across multiple field names. If you want to do the same thing in another worksheet you will get a warning message "Cannot assign two members the same value (alias)". Also, Dimensions behave differently than Measures when assigning aliases because the aliases refer to the actual categories represented by that field and not the field name itself.
        2. You can show this by opening a new sheet and recreating the original table. Force the error message to make the point clear.
    iv. Right-click Term Code Key and select Create > Calculated Field, rename it "Semester". Swap out Term Code Key with Semester.
    v. Show how to edit aliases for the Semester variable.
        1. Right-click on Semester and select Aliases
        2. Change the term codes to term descriptions (Fall 2016, etc.)
k. Understand generated fields, measure names and measure values
    i. Number of Records
    ii. Longitude and Latitude
    iii. Measure Names and Measure Values
        1. Allows user to manage multiple measures at once
        2. Show the Filters option to add all Measures to the display at once
C. Organizing and Simplifying Data
    a. Filtering and sorting
        i. Add a filter to the view
            1. Drag Semester to the Filters shelf and remove the Spring semesters
        ii. Add a context filter (save for later)
            1. Normal filters in Tableau are independent of each other. It means each of the filter reads all the rows from the source data and creates its own result. However, there may be scenarios where you might want the second filter to process only the records returned by the first filter. In

such a case, the second filter is known as dependent filters because they process only the data that passes through the context filter.
2. Use the "Research Expenditures" Workbook as an Example > Top 20 Ranks by Category.
   iii. Add a date filter
1. Drag Birth Date to Filters and select only students who were born as of 1/1/2000
2. Remove Birth Date filter and experiment with a filter on Age
   iv. Filter on the extract
1. Create an extract of the data
2. Click Add on Filters next to the Extract connection. Select Report Ethnicity and choose all Domestic Minority categories.
3. All remaining worksheets using the same extract will have the same filter applied. Advantages are when you are working with a really large data set but you know that you only need to work with a small segment of that population.
   v. Default sorting properties
1. Open a new worksheet (Sheet 3)
2. Drag College to the Rows shelf
3. Right-click on College > Default Properties > Sort
4. Experiment with sorting options
   vi. Sorting by measure values
1. Drag Total Cr Hrs to Columns, change SUM to AVG
2. Click sort option at the top to sort in descending order, or ascending order
3. Change to table view with Total Cr Hrs and Cum Gpa in side-by-side columns
4. Click the same sorting options at the top. Now it is sorting the measure names by the measure values but it doesn't work the way we want it to.
5. Right-click on the College pill in the Rows shelf and select Sort.
6. Sort by Field, Field Name = Cum Gpa, Aggregation = Avg, in descending order
7. With one click, switch back to Alphabetic on the College names
b. Building groups, hierarchies and sets
   i. Create a visual group
1. Click back to the map on Sheet 2
2. Select the five countries in Central and Caribbean America and group together
3. Show how to Edit the newly create Group field
   a. Change names of new group
   b. Add a group for US
   c. Add a group for All Other Countries
   d. Edit the colors to highlight the differences.
   ii. Create a group using labels
1. Click back on Sheet 3
2. Highlight AE and IC and group together. Rename the group.
   iii. Create a set

1. Sets are custom fields that define a subset of data based on some conditions
2. The members of a dynamic set change when the underlying data changes. Dynamic sets can only be based on a single dimension
3. Right-click on Rand ID and select Create > Set
4. Names the Set "Students with GPAs below 2.0"
5. Select Condition, By field = Cum GPA, Sum or Avg will produce the same results here because it is looking row-level at each student, < 2
6. Use separate sheet to show the Set filter in action
7. Add the Set to the filter for Sheet 3
8. Use an alternative example: Create a set on Rand ID for "Top 5 in Total Credit Hours"
9. Drag the new Set to the filters and note how the table disappears.
10. Change the "Students with GPAs below 2.0" to a context filter
   iv. Organize dimensions into a hierarchy
      1. Edit the extract filter to remove the Report Ethnicity filter
      2. Use the following code to create a recode for Condensed Race:
         a. IF[Report Ethnicity]="White" THEN "Domestic White"
            ELSEIF[Report Ethnicity]="American Indian or Alaskan Native" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Asian" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Black or African American" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Hispanic of any race" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Native Hawaiian or Other Pacific Islander" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Two or more races" THEN "Domestic Minority"
            ELSEIF[Report Ethnicity]="Non-Resident Alien" THEN "International"
            ELSE "Unknown" END
      3. Create a new worksheet.
      4. Drag Report Ethnicity to Condensed Race to create a new hierarchy and rename it Race and Ethnicity
      5. Drag Race and Ethnicity to Rows, add Number of Records to Text
      6. Click on the plus sign to expand the category
      7. Use Majors by College as another example. Drag Major to College
D. Exploring & Analyzing Data
   a. Open a blank Tableau workbook
   b. Connect to Access database. Browse to "Research_Sample_DB.accdb"
   c. Show option to Convert to Custom SQL
      i. Go to Sheet 1 and pull in "Fsyr" to Rows. Show there are seven years of data.
      ii. Go back to Data Source tab, go to Data > Convert to Custom SQL and add a WHERE statement to the bottom of the script (WHERE [FSYR] >= '2015')
      iii. Go back to Sheet 1 and confirm that there are now only 5 years in the data
   d. Chart types

i. Only show a few options: Combined Axis Charts, Dual Axis Charts, Scatter Plots, Box Plots and Cross Tabs (saved the rest for extra time at the end)
ii. Understand how and when to build:
1. Combined axis charts
   a. Click on a new worksheet
   b. Drag Total Expense to Rows
   c. Drag Fsyr to Columns
   d. Drag Direct into the view until you see the "2 bars" icon
   e. Do the same with the Total Icr field
   f. Explain what is being shown on the chart
   g. Show how to edit the color options, how to add mark labels and how to sort dimensions in the axis
   h. Drag Measure Names to Color
   i. Change default labels, color palette, title and font
2. Dual axis charts
   a. Click on a new worksheet
   b. Drag Total Expense to Rows
   c. Drag Fsyr to Columns
   d. Drag Direct to the right-hand of the view to create a dual axis chart
   e. Right-click the secondary axis and select "Synchronize Axis" and remove "Show Header"
   f. Experiment with Dual Axis between Lines, Bars, Area and experiment with Colors to make it more visually appealing
   g. Experiment with Axis Labels, hiding headers and edit the aliases on the Measure Names
3. Scatter plots
   a. Click on a new worksheet
   b. Drag Total Expenses to Rows
   c. Drag Total Icr to Columns
   d. Analysis > Uncheck "Aggregate Measures"
   e. Experiment with ways to color the dots, try adding the Org3 Desc to Color pill
   f. Show the Analytics > Trend Line option (right-click on a line to change it to 1 line for the whole viz as opposed to a separate line for each color)
   g. Add "Fundtype2 Desc" to Tooltip. Find out who the outliers belong to > Centennial School
   h. Add an area annotation next to these dots: "These outliers are the Centennial School"
   i. Drag "Fundtype2 Desc" to the Shape card.
4. Cross tabs
   a. Click on a new worksheet
   b. Drag Org3 Desc to Rows
   c. Drag Source Desc to Columns
   d. Drag Total Expense to Text
   e. There is some cleaning up to do on this. Duplicate and rename both the Org3 Desc and Source Desc fields to "Academic

Unit/College" and "Funding Source" and replace with the original fields

  f. Fix any aliases in both dimensions (RCEAS)

  g. Add Column Grand Totals to table

  h. Play around with sorting columns in descending order

  i. Rename Title to "Total Expenses by Funding Source"

5. Box plots
   a. Click on a new worksheet
   b. Drag Total Expense to Rows
   c. Drag Funding Source to Columns
   d. Select Box Plots from the Show Me section
   e. Experiment with the layout of the Box Plot
      i. Disaggregate Measures
      ii. Add Funding Source to Color
      iii. Add Funding Source to Label
      iv. Edit Axis to zoom into the box
6. Histograms (save for the end, if extra time permits)
   a. Summary of numeric distribution
   b. Drag Total Expense to Rows
   c. Go to Analysis > Aggregate Measures to remove aggregation
   d. View the graph for outliers (>$2 mil)
   e. Return to Aggregate Measures
   f. Right-click on Total Expense and create a "Expense Outliers" field: [Total Expense] > 2000000
   g. Drag Expense Outliers to Filter and select F
   h. Remove the Color card. Go to Show Me and select Histogram
   i. Experiment with adjusting the bin size
7. Tree maps (save for the end, if extra time permits)
   a. Click on a new worksheet
   b. Drag Org3 Desc to Rows and Total Expense to Columns. Select Tree maps from the Show Me section
   c. See the Engineering makes up the large amount of total expenses in terms of SUM of Total Expenses
   d. Switch to Average of Total Expense. Now College of Education makes up the largest box.

iii. Understand how to effectively use titles, captions and tooltips
   1. Change Title of Box Plots sheet
   2. Add a caption and show how to edit it
   3. Click on the Tooltip card to show what is there and compare that to what pops up when you hover over the mark
   4. Drag Fundtype2 Desc and Org3 Desc to Detail
   5. Go back into the Tooltip, rename the labels to Fund Type, College/Unit, Fund Source, Total Expenses
   6. Show how the State marks can now be viewed in more detail. Centennial School in the College of Education.
   7. Experiment with shifting between aggregated and disaggregated views

iv. Understand how to edit axes
   1. Right-click Edit Axis

2. Rename Total Expenses to Total Expenses
3. Experiment with other settings
4. Try log transformation to show how the box changes again
v. Understand mark labels and annotations
vi. Save the workbook as "Training_ExampleVizSheets.twb"
e. Calculations and data aggregations
i. Open the "Enrollment Summary_Copy" workbook
ii. Show examples of different types of calculated fields
iii. Build grand total and sub-totals
1. Re-open the Training_ExampleVizSheets workbook (if closed)
2. Go to the Cross Tab sheet
3. If not already added, add the Column Grand Totals and Row Grand Totals
4. Duplicate Org2 Desc and rename it "Administrative Unit"
a. Create a hierarchy variable by dragging Academic Unit/College onto Administrative Unit and rename it "Stem & Unit"
5. Add all Subtotals
iv. Create quick table calculations
1. Remove the Subtotals from the table
2. Click on the drop arrow for SUM(Total Expense) and select Quick Table Calculation > Percent of Total
3. Play around with Compute Using to see different options
4. Show the Edit Table Calculation option
5. Drag Total Expense to Color
6. Change the Marks card to Square
7. Create a Table Calculation for the Color version of SUM(Total Expense) and change it Percent of Total by Table (Down)
v. Work with aggregation options
1. Experiment with different aggregation options
a. Create a duplicate of Cross Tabs
b. Remove the Table Calculation on SUM(Total Expense)
c. Play around with different aggregation options on SUM(Total Expense): AVG, COUNT, MIN/MAX, ST DEV/VAR, keep it at SUM
d. Play around with different aggregation options on the Color version of SUM(Total Expense). Use the CNT. Add a caption and edit it.
e. Rename the original Cross Tab to "Cross Tab – Colored by Total" and the new one to "Cross Tab – Colored by Count"
vi. Creating and working with parameters
1. Add "Funding Source" filter to the view and experiment with selecting different categories
2. Alter the filter to only include Funding Source with a total over $1.5M
a. Edit Filter
b. Condition > By field: Total Expense, Sum, > 1,500,000
c. Show the filter options on the right
d. Add "Source Desc" to filters. Re-create the same condition and add to Context, to remove the unnecessary categories from the Funding Source filter options.

3. Go back to "Enrollment Summary" workbook and show examples of Parameters
4. Create Parameter
5. Name it "Select Metric" and add the following categories:
   a. Total Expense
   b. Direct
   c. Total Icr
6. Show Parameter Control
7. Create Calculated Field called "Selected Metric"
   a. CASE[Select Metric]
      WHEN "Total Expense" THEN [Total Expense]
      WHEN "Direct" THEN [Direct]
      WHEN "Total Icr" THEN [Total Icr]
      END
8. Replace "Total Expense" with "Selected Metric"
9. Use the Parameter Control to show the changes in the table column
10. Duplicate the "Fundtype2 Desc" field and rename it "Fund Type"
11. Create another Parameter
12. Name it "Select Dimension" and add the following categories:
    a. Fund Type
    b. Funding Source
13. Show Parameter Control
14. Create Calculated Field called "Selected Dimension"
    a. CASE[Select Category]
       WHEN "Fund Type" THEN [Fund Type]
       WHEN "Funding Source" THEN [Funding Source]
       END
15. Replace "Funding Source" with "Selected Dimension"
16. Use the Parameter Control to show the changes in the table column
17. Recreate the Sort for the Columns
    a. Right-click Select Dimension > Sort > by Field > Descending > Selected Metric > Sum

f. Mapping (save for later, consider the Alumni Donors by Region example)
   i. Pan and zoom
   ii. Filtering
   iii. Map layering
   iv. Custom territories
   v. Understand how to modify locations within Tableau
   vi. Understand how to use a background image map

g. Apply analytics to a worksheet (save for later)
   i. Create a duplicate of the Dual Axis Chart
   ii. Remove the Direct line to simplify the chart and rename "Bar Chart"
   iii. Reference lines, reference bands
       1. Click on the Analytics tab
       2. Experiment with reference lines and reference bands
   iv. Trend lines, trend model
       1. Click on the Scatter Plot chart and remove annotations from the previous example

2. Experiment with the Trend Line
                    3. Go to Edit Trend Line and uncheck the "Allow a trend line per color"
            v. Forecasting
                    1. Go back to the Bar Chart sheet
                    2. Remove the reference line from the original example
                    3. Calculated an "Estimated Date" field: DATE("06-30-"+[Fsyr])
                    4. Replace "Fsyr" with the "Estimated Date"
                    5. Change the Esimated Date to continuous
                    6. Change the Marks to a line
                    7. Go to the Analytics tab and drag in the Forecast
                    8. Experiment with the options
E. Presenting and Publishing Data
    a. Use the "Training_ExampleVizSheets" workbook as an example to create a dashboard
            i. Go to the Box Plot sheet
           ii. Change to horizontal layout
          iii. Clean up the marks card by removing unnecessary elements
          iv. Replace all measures and dimensions with the new Selected Metric and
              Selected Dimensions fields
           v. Add the Parameter Controls
          vi. Add "Academic Unit/College" to Details
         vii. Cleanup the Tooltip:

                       Academic Unit: **<ATTR(Academic Unit/College)>**
                       Selected Dimension: **<ATTR(Selected Dimension)>**
                    1. Selected Metric: **<SUM(Selected Metric)>**
        viii. Rename the Title to "Box Plot of Selected Metric by Selected Dimension"
    b. Format view for presentation
            i. Color, Bolding, Shapes, Size of marks, Fonts
                    1. Before creating dashboard, check the layout of "Cross Tab – Colored by
                       Count" and "Box Plot" and determine if there is any editing needed to
                       the format
                    2. Bold the Title and Select Dimension headers
                    3. Play around with color and size of the column headings on the Cross Tab
                    4. Play around with color, size and opacity of the circles on the Box Plot
    c. Create and modify a dashboard
            i. Open a blank dashboard window
           ii. Talk about the difference between Tiled and Floating
          iii. Talk about the Size settings and Default Previews
                    1. Set the Size first (1150 x 850)
                    2. Show the Phone and Device Previews
          iv. Drag the 2 worksheets into the view with the Tiled setting
           v. Repeat the same things with the Floating setting to show the difference
                    1. Remove all filters, legends and parameters when doing this
          vi. Remove the Row Grand Totals from the Cross Tab to fit all columns
         vii. Edit Axis on Box Plot to start the axis at 50, to center the view better
        viii. Use the Layout window to align the 2 windows
          ix. Add back in the Color Legends and Parameters for both worksheets

        x.   Show that the Parameters already work for both visualizations

       xi.   Show that Filters work differently

          1.   Pull in a Filter for Administrative Stem

          2.   Show that it only affects the first viz

          3.   Click drop arrow > Apply to Worksheets > Selected Worksheets

      xii.   Add dashboard actions

          1.   Dashboard > Actions > Highlight

          2.   Name it "Highlight Box Plot"

          3.   On "Select" the "Cross Tab – Colored by Count"

          4.   Target Sheets: Both

          5.   Target Highlighting: All Fields

          6.   Show difference between All Fields and Selected Fields

          7.   Add another Dashboard Action, this time a Filter

          8.   Name it "Filter Cross Tab"

          9.   On "Select" the "Box Plots"

          10. Target Sheets: Cross Tab

          11. Target Filters: All Fields

          12. Change to Selected Fields "Academic Unit/College", show the difference in how the filter works

          13. Show that the "Research – Other" category is still being shown in the Box Plot because we never applied the Source Desc context filter to the Box Plot as well. Go back and do that.

   d.   Publishing dashboards to Tableau Server

        i.   Show how to Sign in to Server

       ii.   Publish the Dashboard as a "Live Version"

          1.   Show the "Include external files"

      iii.   Show the Published Data Source option (unable to right now)

      iv.   Change to an extract connection

       v.   Re-publish as a "Extract Version"

          1.   Show that the "Include external files" is no longer there

          2.   Prompt to embed credentials, click Yes

          3.   Examine the results and show how they differ

          4.   Set a Refresh Schedule for the Extract

      vi.   Show the Permissions settings, users and site roles, etc.

F.   Understanding Tableau Concepts

   a.   Aggregation

        i.   Explain why Tableau aggregates measures

       ii.   Describe how an aggregated measure changes when dimensions are added to the view

      iii.   Use LOD calculations; types of LOD calculations

          1.   Open the "First Year Survey_Copy" workbook

          2.   Show the "courses" worksheet

          3.   Show what the LOD calculation looks like (% of Respondents)

          4.   Show the original attempt:

              a.   Drag "ResponseValue" to Label

              b.   Create a Quick Table Calculation for Percent of Total

              c.   Show the course counts worksheet

            i. Show that the 18.3% is coming from the number of Calculus courses divided by the total number of courses

    d. Show the overall count worksheet: 1,016

            i. Explain how Tableau is only looking at the data available in the View

            ii. We have applied Filters, so it's not looking at the overall sample

    e. Go back to the LOD calculation

            i. Explain that it is showing the level for the numerator and the level for the denominator separately

            ii. Show how the script for the numerator matches what we see in the "course counts" sheet, and the script for the denominator matches what we see in the "overall count" sheet

5. Review by pulling up a Google window and searching on "tableau what is a level of detail calculation"

    a. Show the order of operations chart and explain how they are applied

6. Show an example of an INCLUDE calculation

    a. Create a new sheet

    b. Drag Fsyr to Columns

    c. Drag Total Expense to Rows, change to AVG

    d. Create a new field called "Total Expense by Academic Unit/College"

            i. {INCLUDE [Org3 Desc]: SUM([Total Expense])}

    e. Change it to AVG

    f. Create a Combined Axis Chart by dragging the new field in next to the original Total Expense. Show the difference.

b. Special Topics

    i. Ask Data feature for Tableau Server 2019.x

    ii. Working within design templates

    iii. Developing a color palette

    iv. Saving metadata properties in a .TDS file

    v. Layout containers for dashboards

    vi. Working with survey data