Rotman

Master of Management Analytics

INTRO TO JMP – PART 1

Bootcamp

August 3, 2022 Prepared by Jay / TDMDAL

Rotman School of Management
UNIVERSITY OF TORONTO

What is JMP

- Predictive analytics software from SAS Institute
  - data manipulation
  - visualization
  - statistical & machine learning modeling
  - reporting

- Intuitive point-and-click interface for beginners
  - Analytics with zero/minimum coding

- Flexible and extensible for advanced users
  - JMP Scripting Language (JSL) for automating or extending point-and-click functionality
  - Connect to Database engine, Matlab, R, Python, Excel, Web API, etc.
  - Connect to the richness of SAS: retrieve SAS data and submit SAS code

See key features of JMP Pro at JMP Pro website.

Why JMP

- Get you started as quickly as possible
  - **amazing** intuitive point-and-click interface
  - quickly get things done

- JMP is a great tool
  - sufficient for many analytics tasks
  - good visualization for reporting/presentation
  - good for initial exploration or rapid prototyping
    - even you plan to use more advanced tools later

- Guide you to learn other tools
  - How do I achieve this JMP data manipulation/modeling/visualization in Python or R?
  - Try to separate the concepts with the software

Learning by Doing

- This workshop is task/problem based;
  - I show you how to do a task
  - You will try yourself on a variation of the task
    - you will discover JMP on your own

- We will mostly focus
  - On learning the tools to do
    - data manipulation
    - visualization and report
    - simple modeling
  - Not on statistical or modeling theories

Learning Resources (jmp.com)

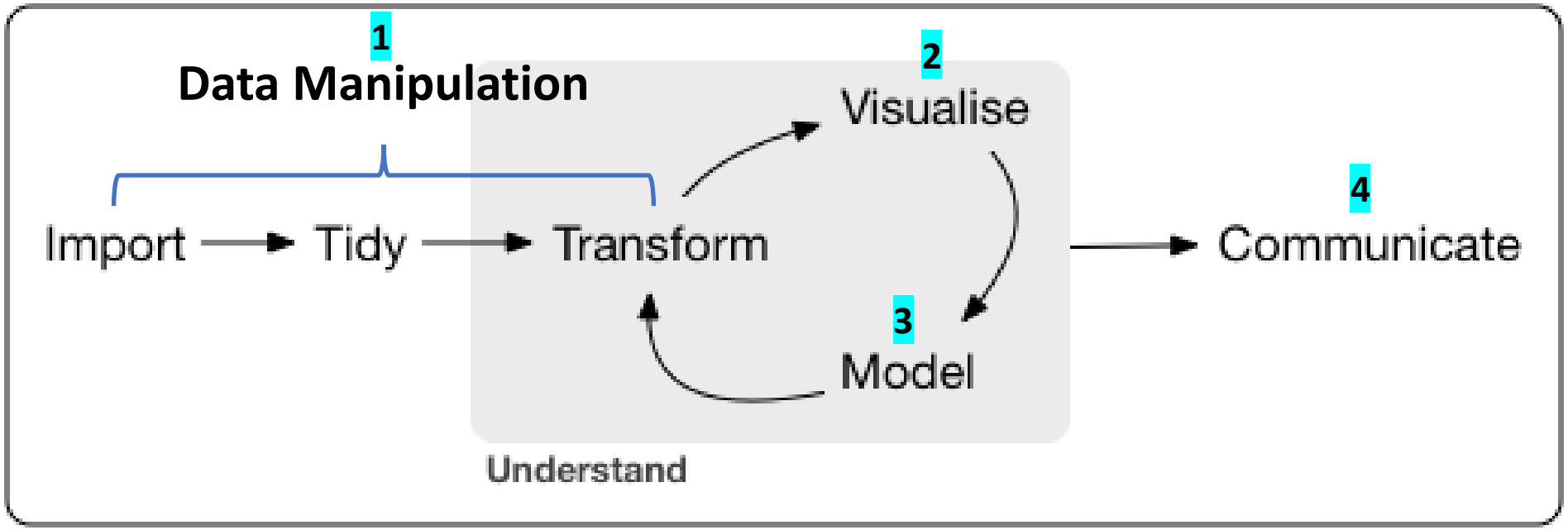
- JMP Academic (Students) 
  - JMP Basics (great beginner videos!)
  - Go Deeper (one-page guide, short videos, webinars, and a full course.)

- JMP Documentation Library (many examples using included datasets)
  - Getting started document: Discovering JMP
  - Basics
    - Using JMP (data table)
    - Basic Analysis
    - Essential Graphing
  - Specific topics
    - Fitting Linear Models
    - Predictive and Specialized Modeling

Plan

- Session 1
  - **Workflow overview**
  - Basic data manipulation
- Session 2
  - Join data tables
  - JMP graphing
- Session 3
  - Modelling
  - JMP Journal
  - JMP Scripting Language

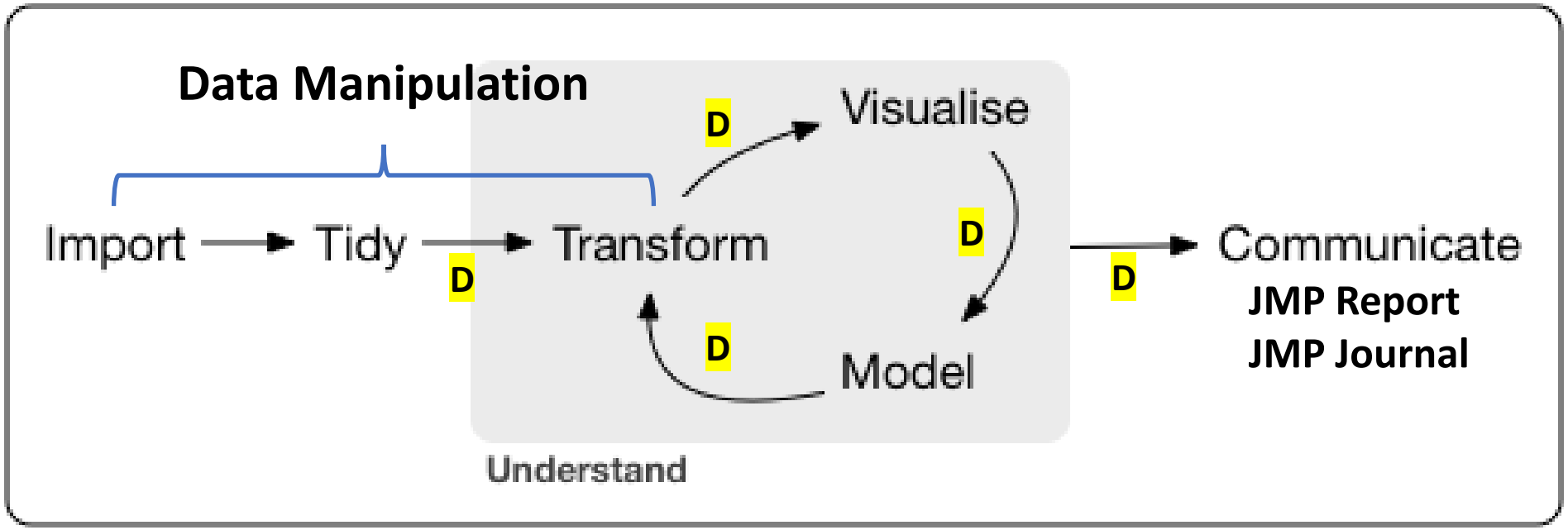
Overview: A Typical Workflow



point-and-click & programming

Concept and graph adapted from https://r4ds.had.co.nz/introduction.html

Overview: JMP Dynamic Link



point-and-click & programming

D: Dynamic Link

Overview: A Simple Workflow Demo

- A simple example
  - import data
  - fit y by x (Profit by # Employ; linear model; “removing” an outlier)

- Data (data/basics/companies_mma.csv)

```
Type,Sales ($M),Profits ($M),# Employ,Assets
Computer,855.1,31.0,7523,615.2
Pharmaceutical,5453.5,859.8,40929,4851.6
Computer,2153.7,153.0,8200,2233.7
…
```

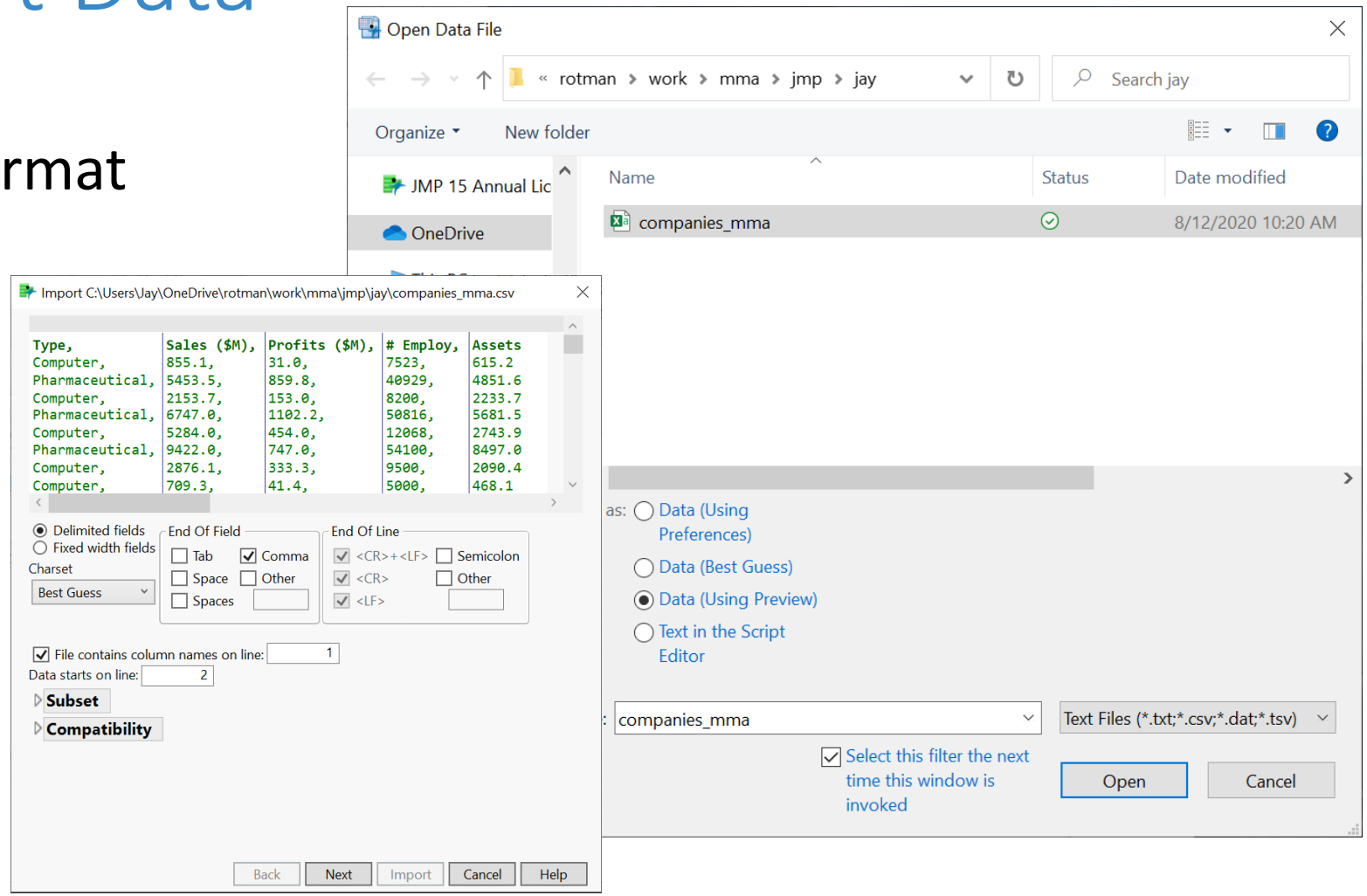
Your Turn (Hands-on; 5mins)

- Repeat the demo I just did
  - import the dataset to a JMP data table
  - fit y by x (Profit by # Employ)
  - exclude an outlier; redo the fit
  - save the analysis script in the data table

- Challenge: run a multiple linear regression
  - predict Profits using number of employees (# Employ) and Sales

Review: Import Data

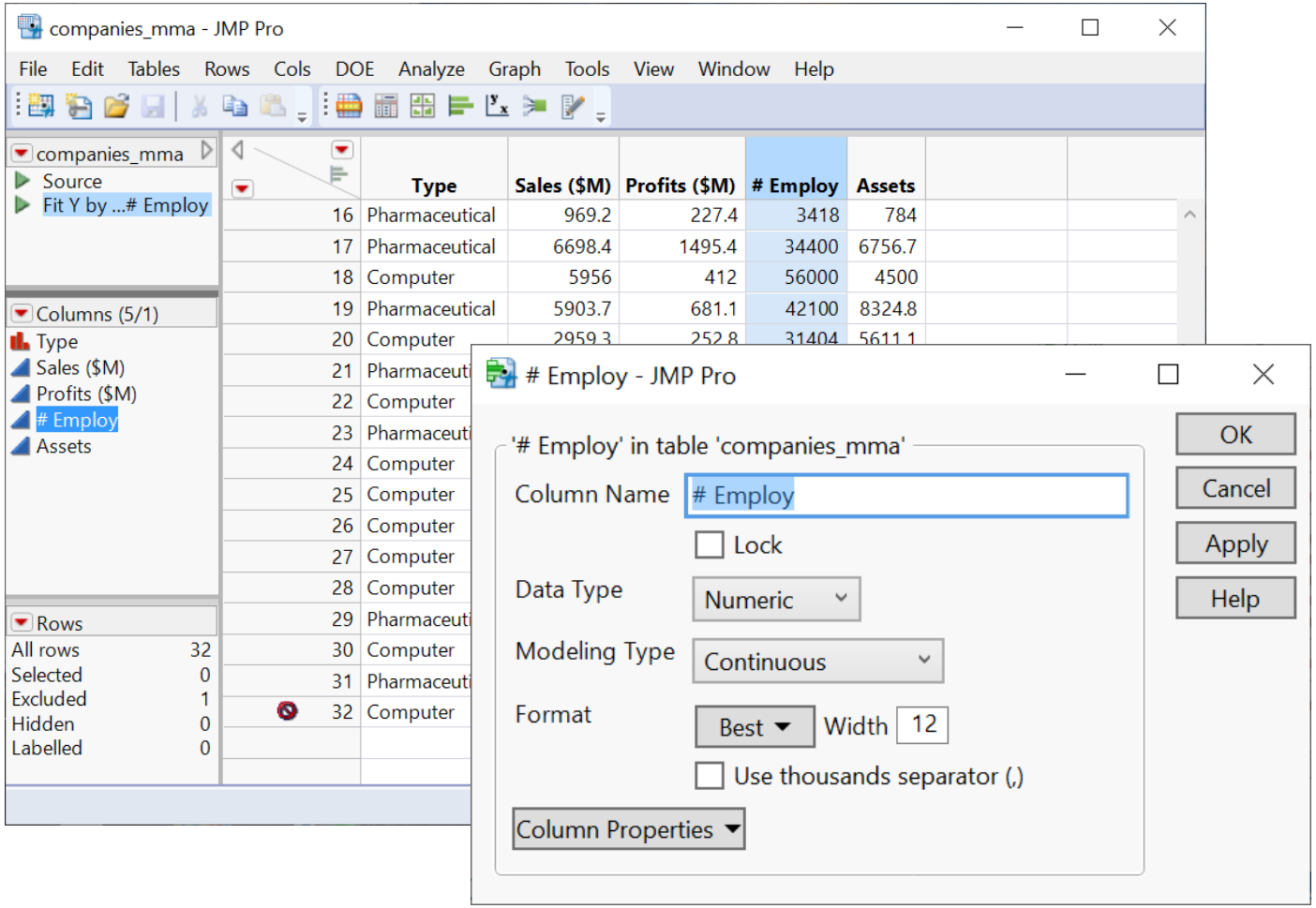
- Support many file format
  - csv
  - Excel
  - json
  - many more



https://www.jmp.com/support/help/en/15.2/#page/jmp/import-your-data.shtml#

Review: Data Table

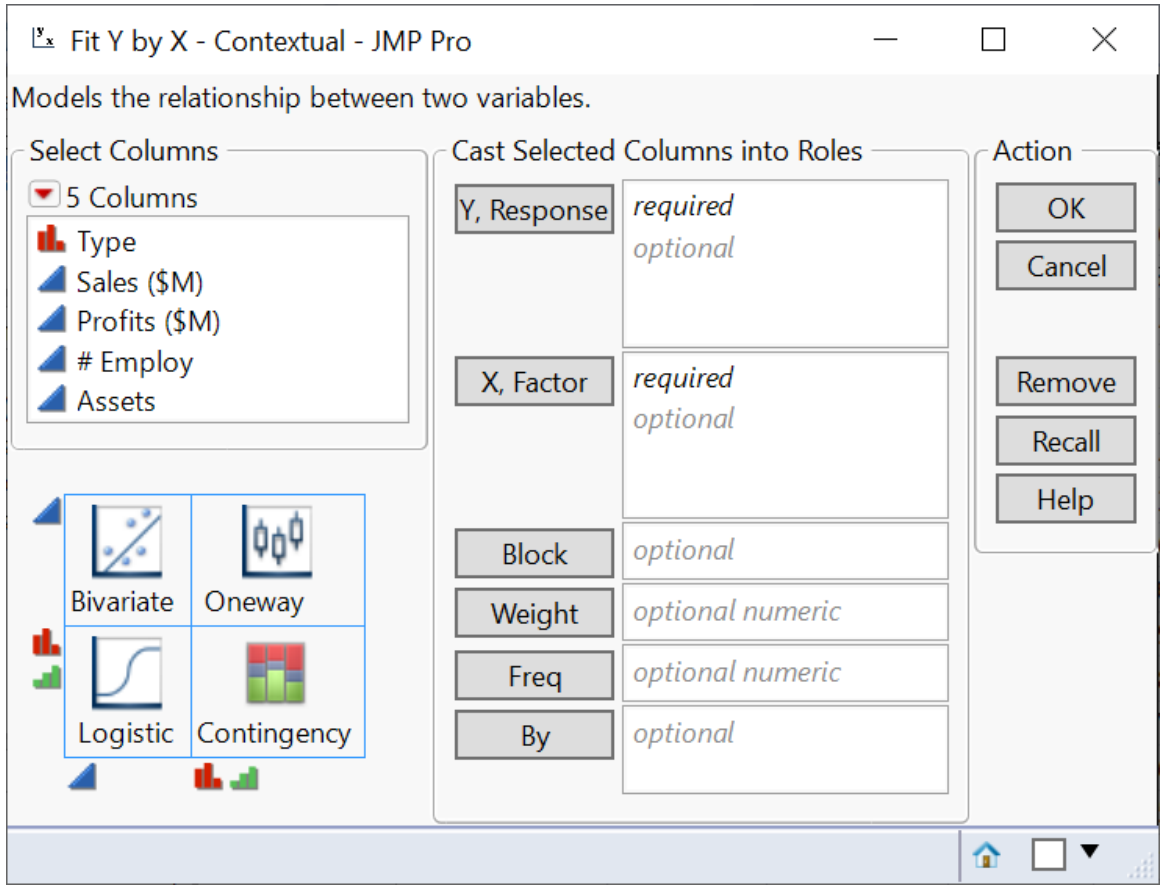
- Three panels on the left
  - Table (JMP Script)
  - Columns
  - Rows
- Column Info
- Excluding rows



https://www.jmp.com/support/help/en/15.2/#page/jmp/work-with-data-tables.shtml#

Review: Fit Y by X Platform

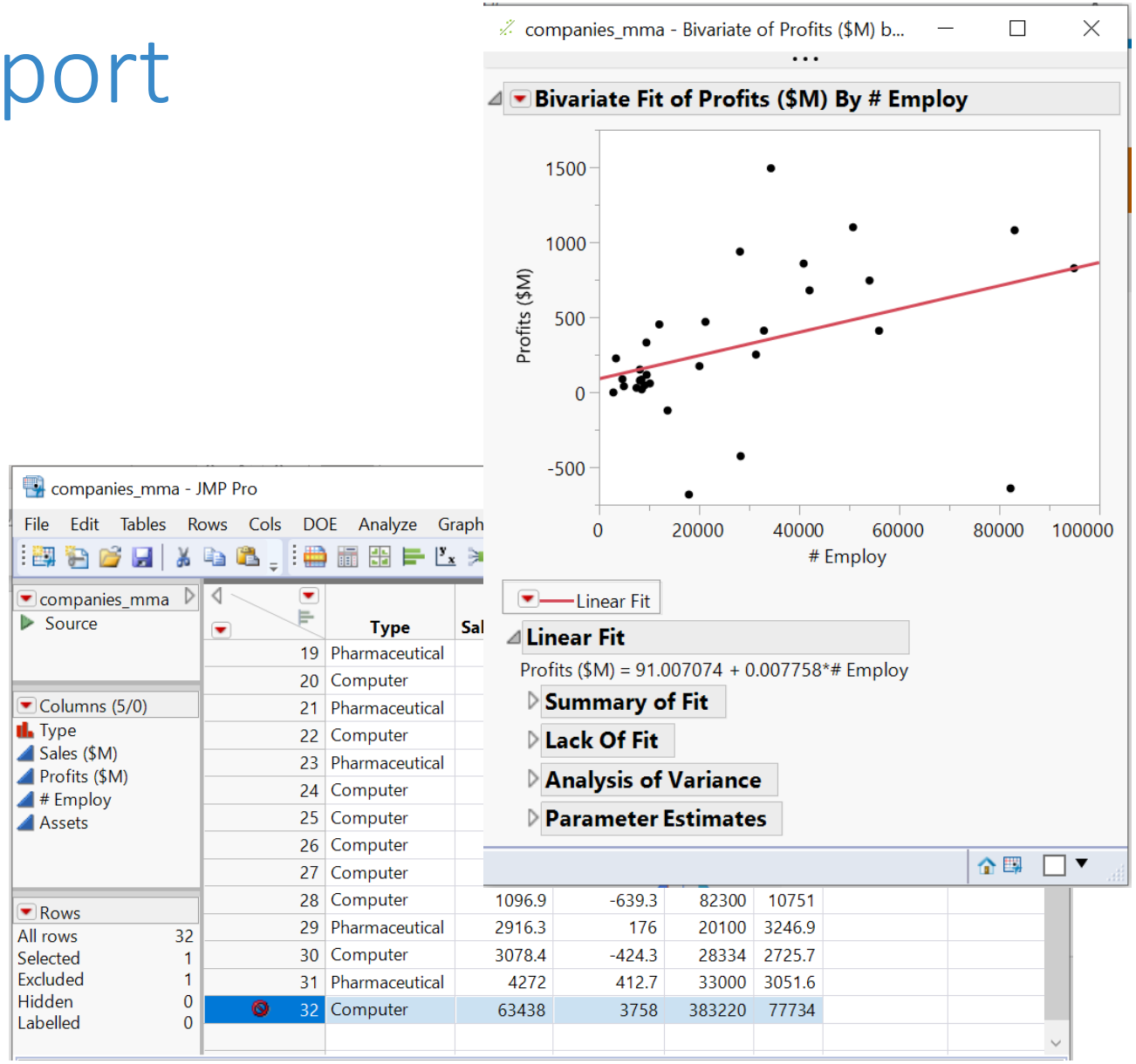
- Relationships between two variables
- Model depends on Y and X variable types
  - 4 main types
  - many model choices under bivariate model



https://www.jmp.com/support/help/en/15.2/#page/jmp/analyze-relationships.shtml#

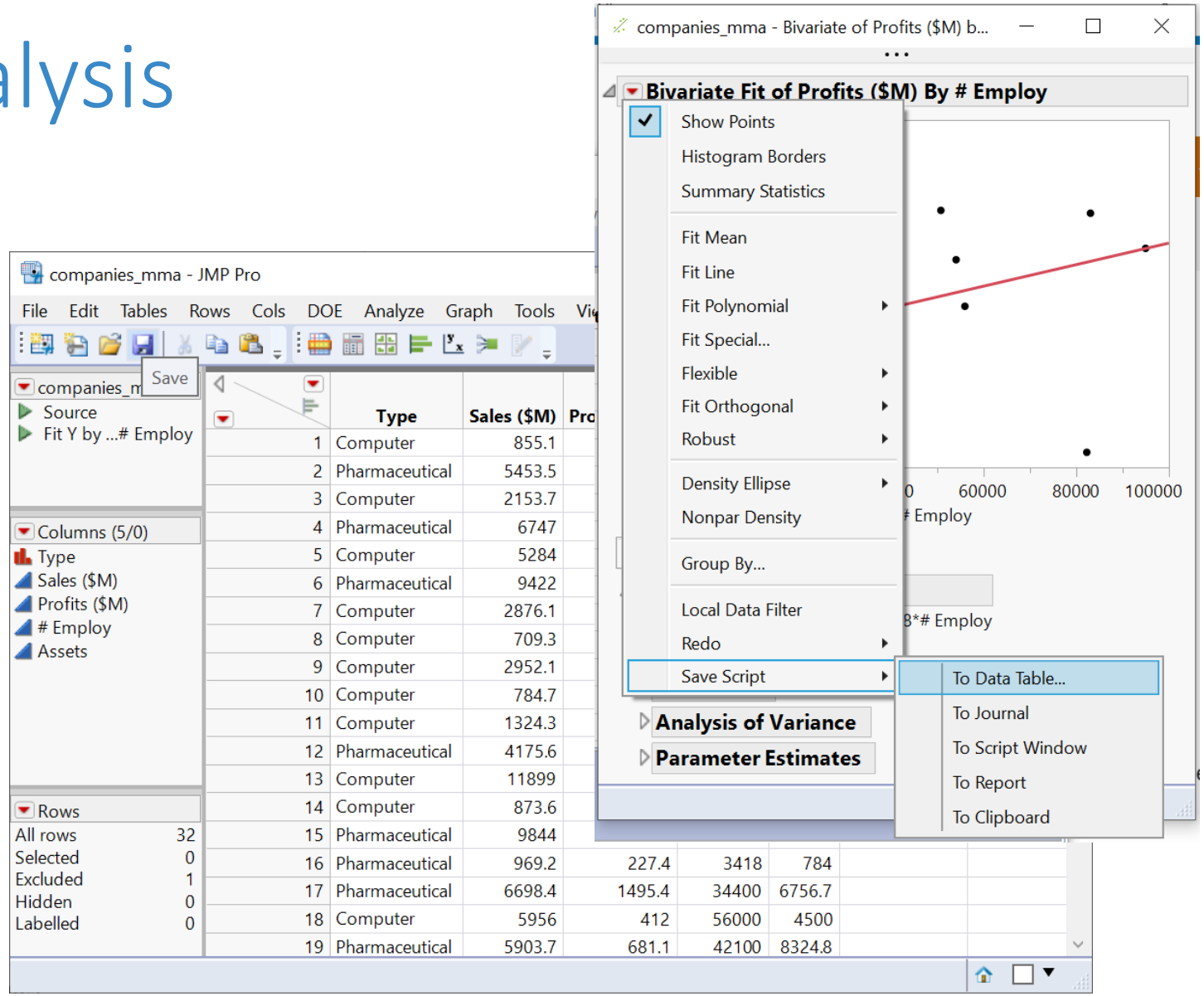
Review: Analysis Report

- Analysis reports are dynamic
  - a report and its underlying data are linked
- Many actions are available under the red triangle buttons
  - redo analysis
  - save script
- Right click gives many actions too



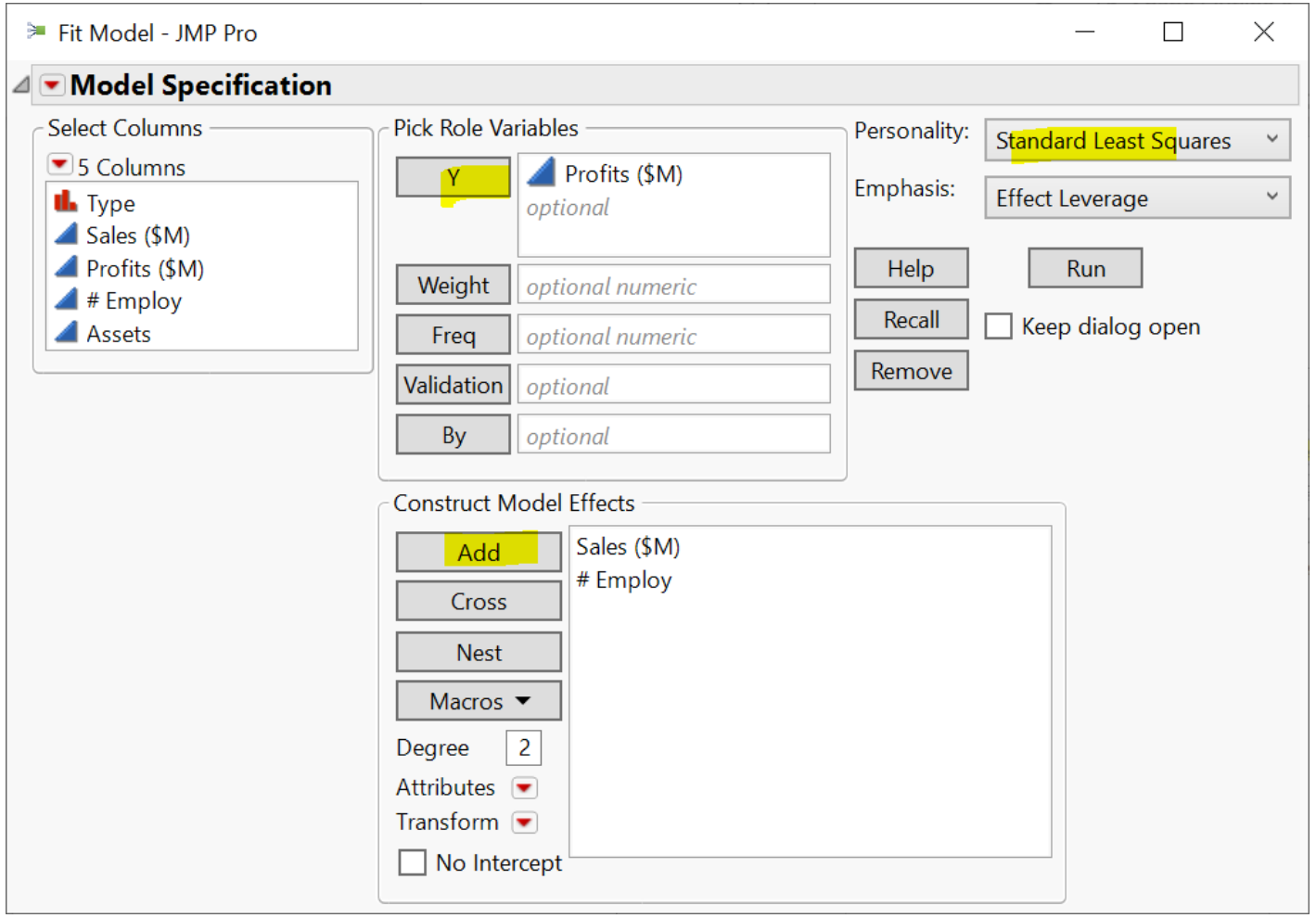
Review: Save Analysis

- Save data table
- Capture a script for analysis report



Review: Fit Model - Multiple Linear Reg

- Analyze > Fit Model

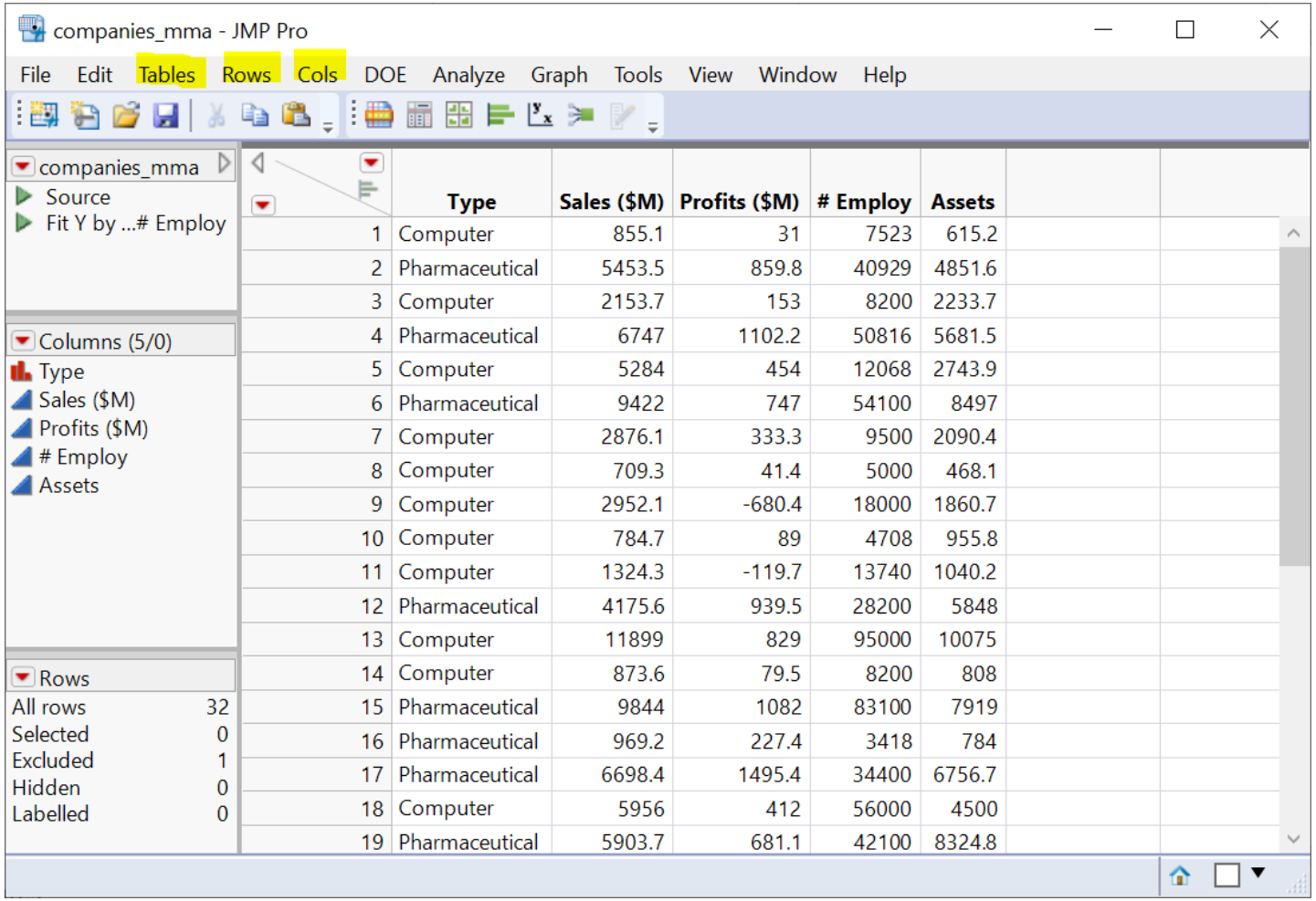


Plan

- Session 1
  - Workflow overview
  - **Basic data manipulation**
- Session 2
  - Join data tables
  - JMP graphing
- Session 3
  - Modelling
  - JMP Journal
  - JMP Scripting Language

Data Manipulation - Overview

- Three levels
  - Columns
  - Rows
  - Tables
    - col + row operations
    - JMP creates a new table



	Type	Sales ($M)	Profits ($M)	# Employ	Assets
1	Computer	855.1	31	7523	615.2
2	Pharmaceutical	5453.5	859.8	40929	4851.6
3	Computer	2153.7	153	8200	2233.7
4	Pharmaceutical	6747	1102.2	50816	5681.5
5	Computer	5284	454	12068	2743.9
6	Pharmaceutical	9422	747	54100	8497
7	Computer	2876.1	333.3	9500	2090.4
8	Computer	709.3	41.4	5000	468.1
9	Computer	2952.1	-680.4	18000	1860.7
10	Computer	784.7	89	4708	955.8
11	Computer	1324.3	-119.7	13740	1040.2
12	Pharmaceutical	4175.6	939.5	28200	5848
13	Computer	11899	829	95000	10075
14	Computer	873.6	79.5	8200	808
15	Pharmaceutical	9844	1082	83100	7919
16	Pharmaceutical	969.2	227.4	3418	784
17	Pharmaceutical	6698.4	1495.4	34400	6756.7
18	Computer	5956	412	56000	4500
19	Pharmaceutical	5903.7	681.1	42100	8324.8

Data Manipulation - Basics

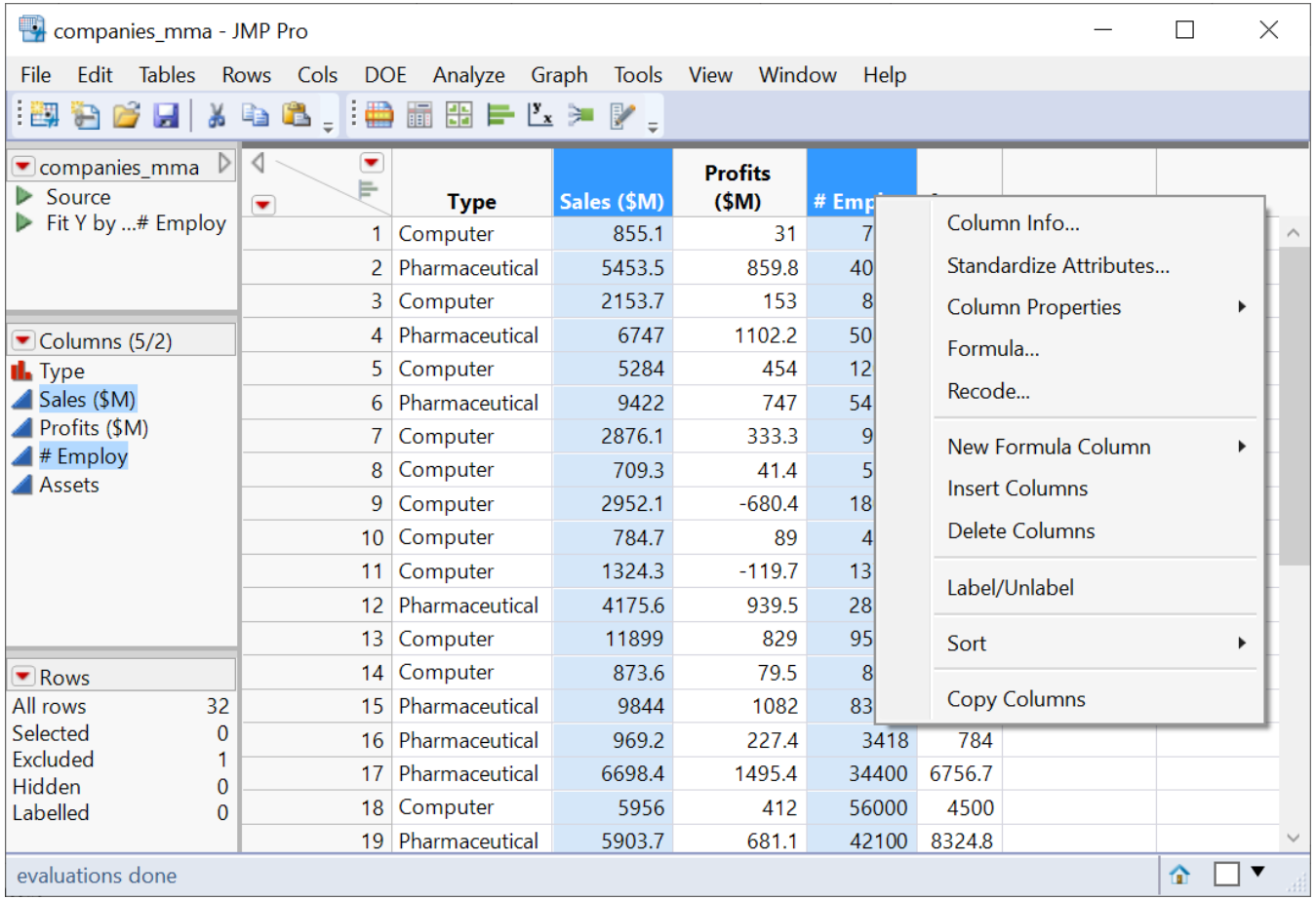
- **Cols**
  - select or de-select columns
  - drop/delete columns
  - add new columns

- Rows
  - order/sort rows (see table operation)
  - filter rows (we have tried excluding certain rows)

- Tables
  - subset a table
  - sort a table
  - aggregate/summarize (by group)

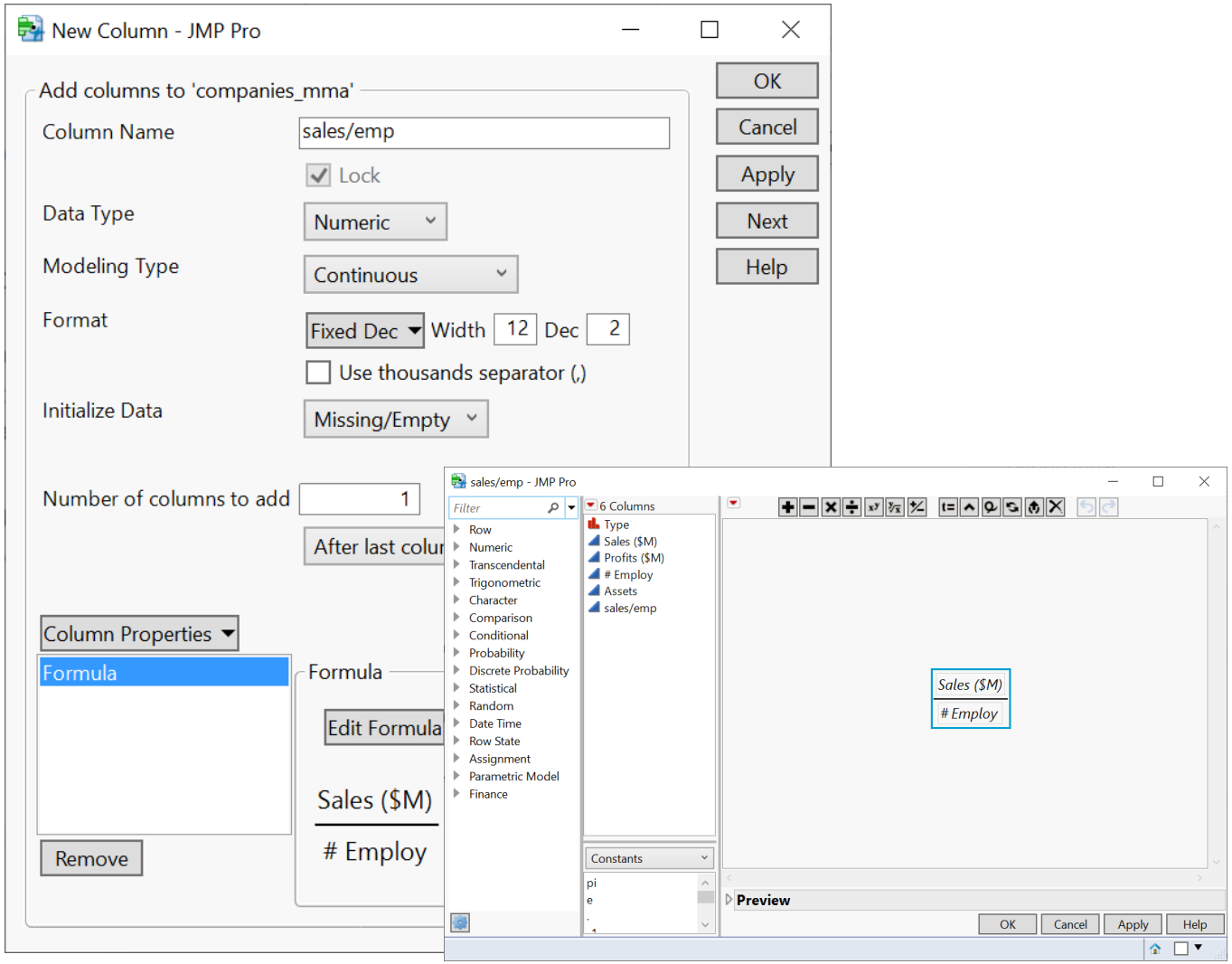
Select and Delete Columns

- Select or deselect columns
  - along with doing analysis
  - in data table window
- Drop/delete columns
  - in data table window
  - Tables -> Subset
    - A new data table will be created



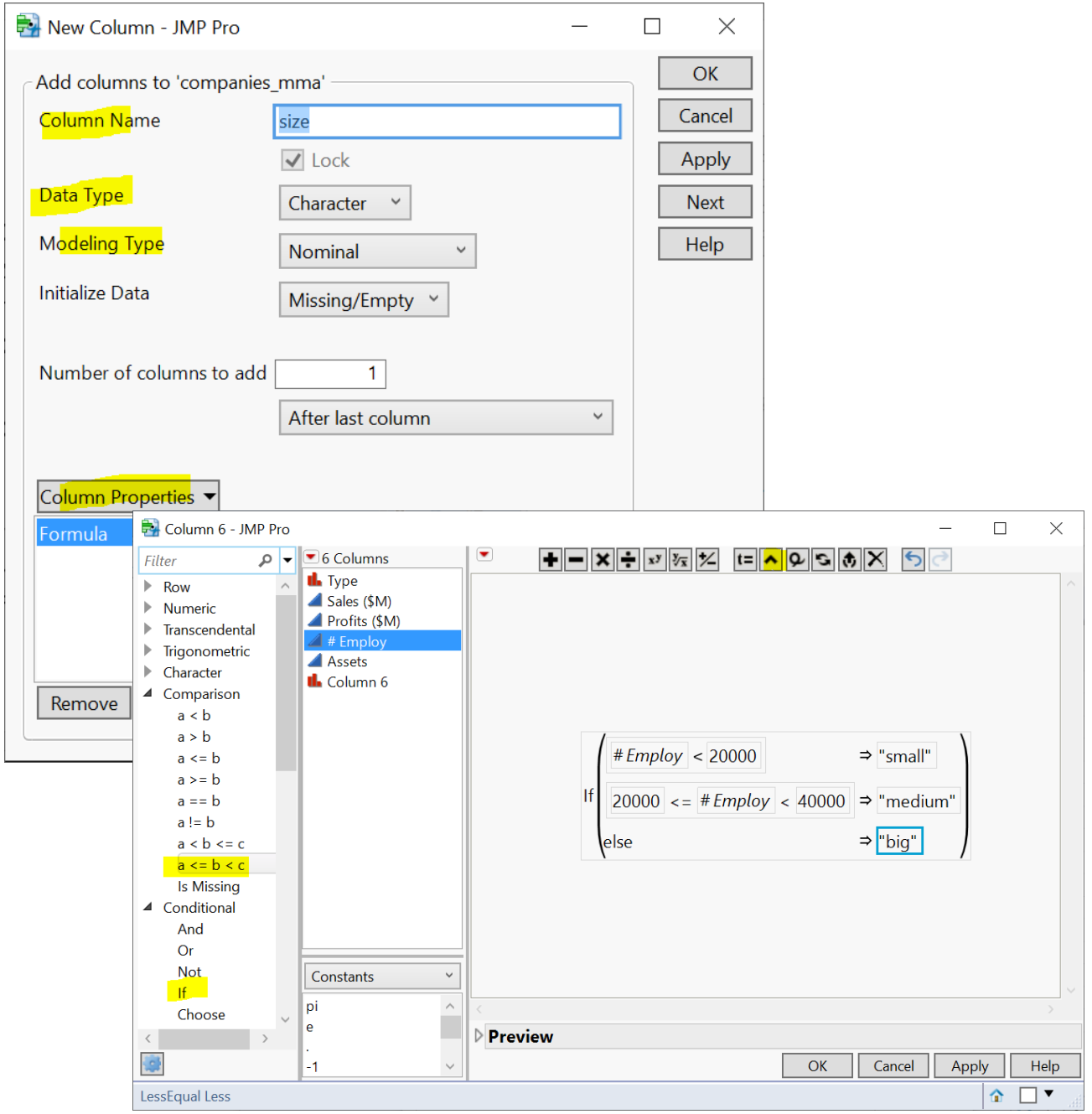
Create a New Column (Demo)

- Create a new column
  - Col name: sales/emp
  - Data type: Numeric
  - Col property: Formula
  - Formula: Sales ($M) / # Employ
- A note on column names
  - JMP is flexible with col names
  - In general, special symbols in col names is not a good idea
- Formula editor

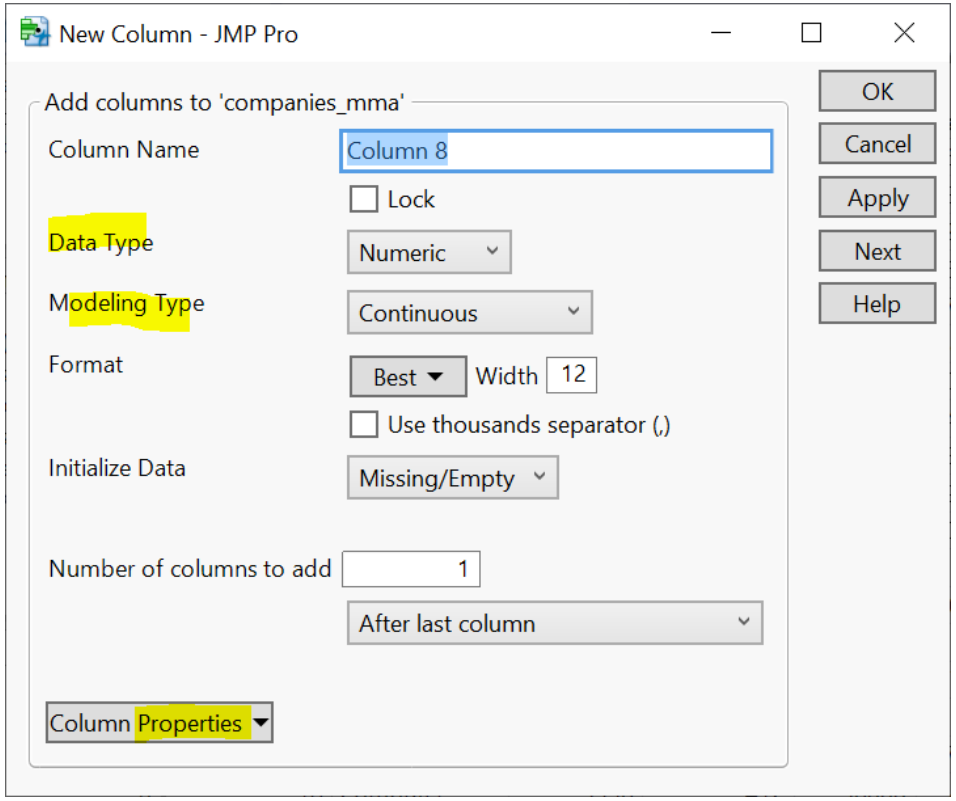


Your Turn (Hands-on)

- Create a new column
  - Col name: size
  - Data type: Character
  - Col property: formula
- It's a categorical variable
  - if # Employ < 20000, then size = "small"
  - if 20000 <= #Employ < 40000, then size = "medium"
  - if #Employ >= 40000, then size = "big"
- Save the result



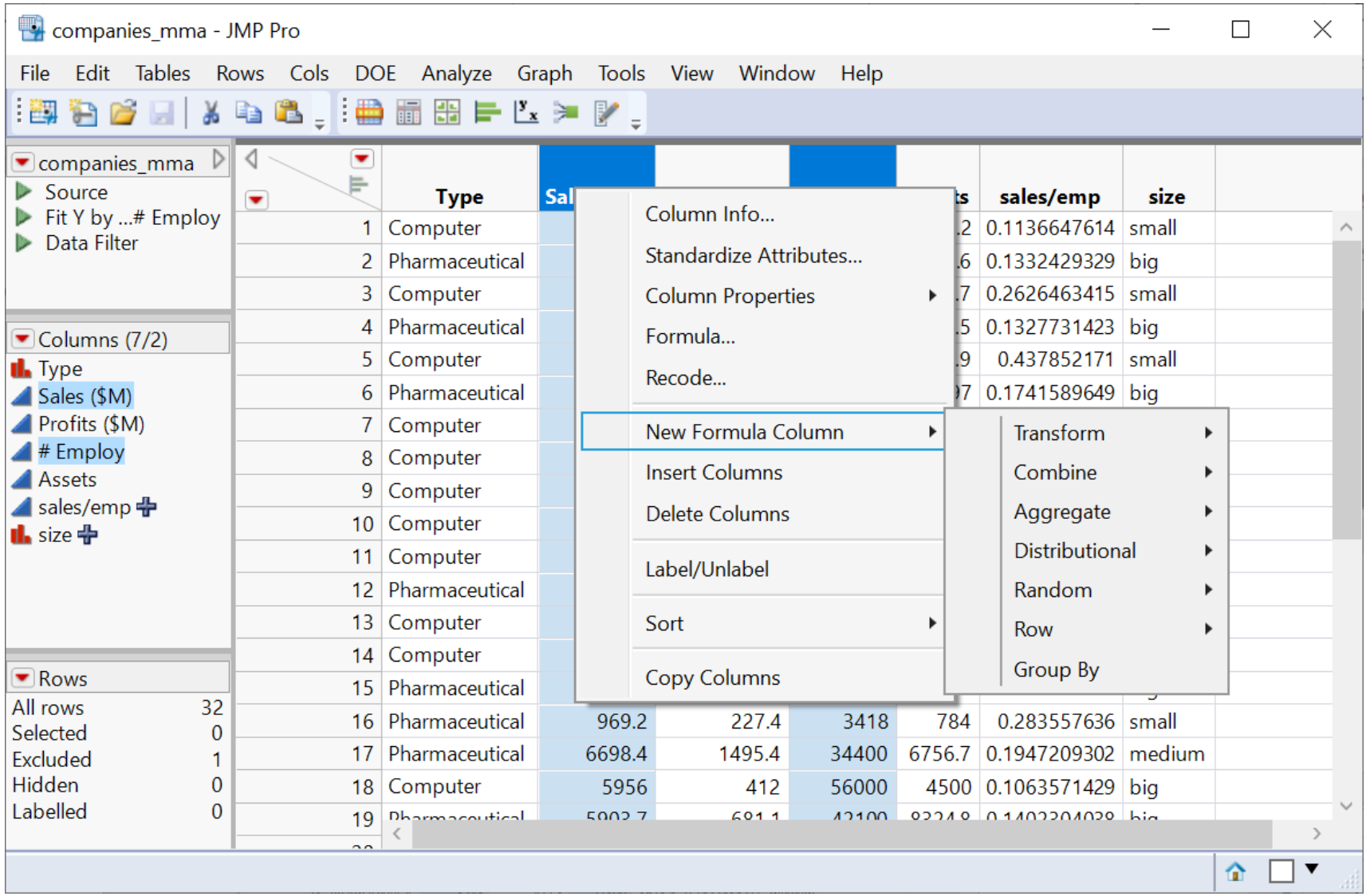
Review: Create a Column



- Data type
  - Numeric
  - Character
- Modelling type
  - Continuous
  - Ordinal (e.g., age: 1, 2, 3, …; Monday, Tuesday, …)
  - Nominal (e.g., male, female)
- Column Property
  - Formula

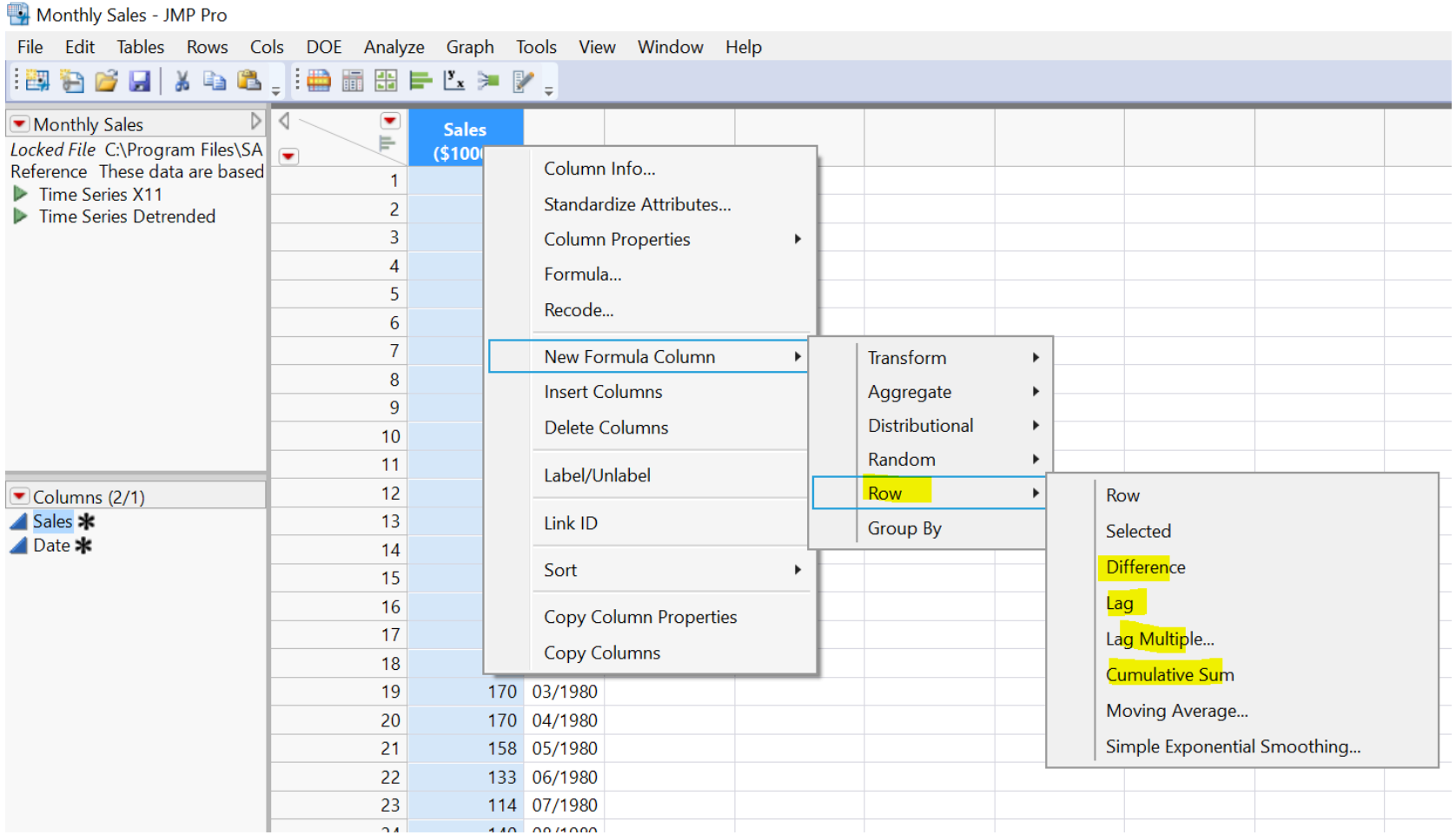
https://www.jmp.com/support/help/en/15.2/#page/jmp/about-the-column-info-window.shtml#

Review: Create a Column Shortcut (Demo)



Review: Create a Column Shortcut

- Some useful transformations for time series manipulation



Data Manipulation - Basics

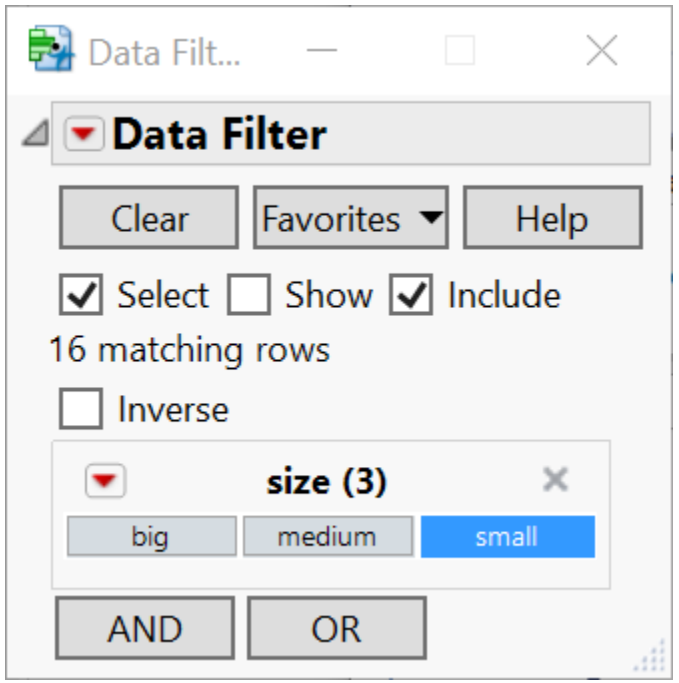
- Cols
  - select or de-select columns
  - drop/delete columns
  - add new columns

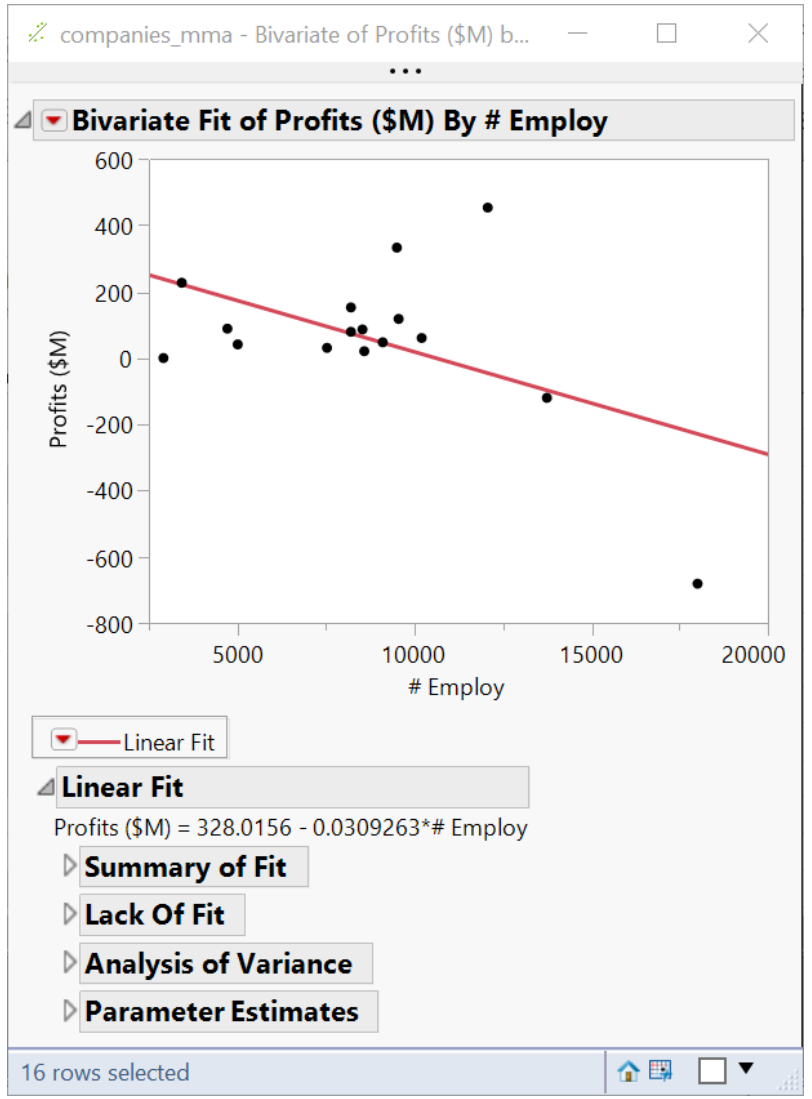
- **Rows**
  - order/sort rows (see table operation)
  - filter rows (we have tried excluding certain rows)

- Tables
  - subset a table
  - sort a table
  - aggregate/summarize (by group)

Filter Rows (Demo)

- Data Filter (global)
  - Affects all linked analysis report
- Rows > Data Filter
  - filter on the **`size`** col

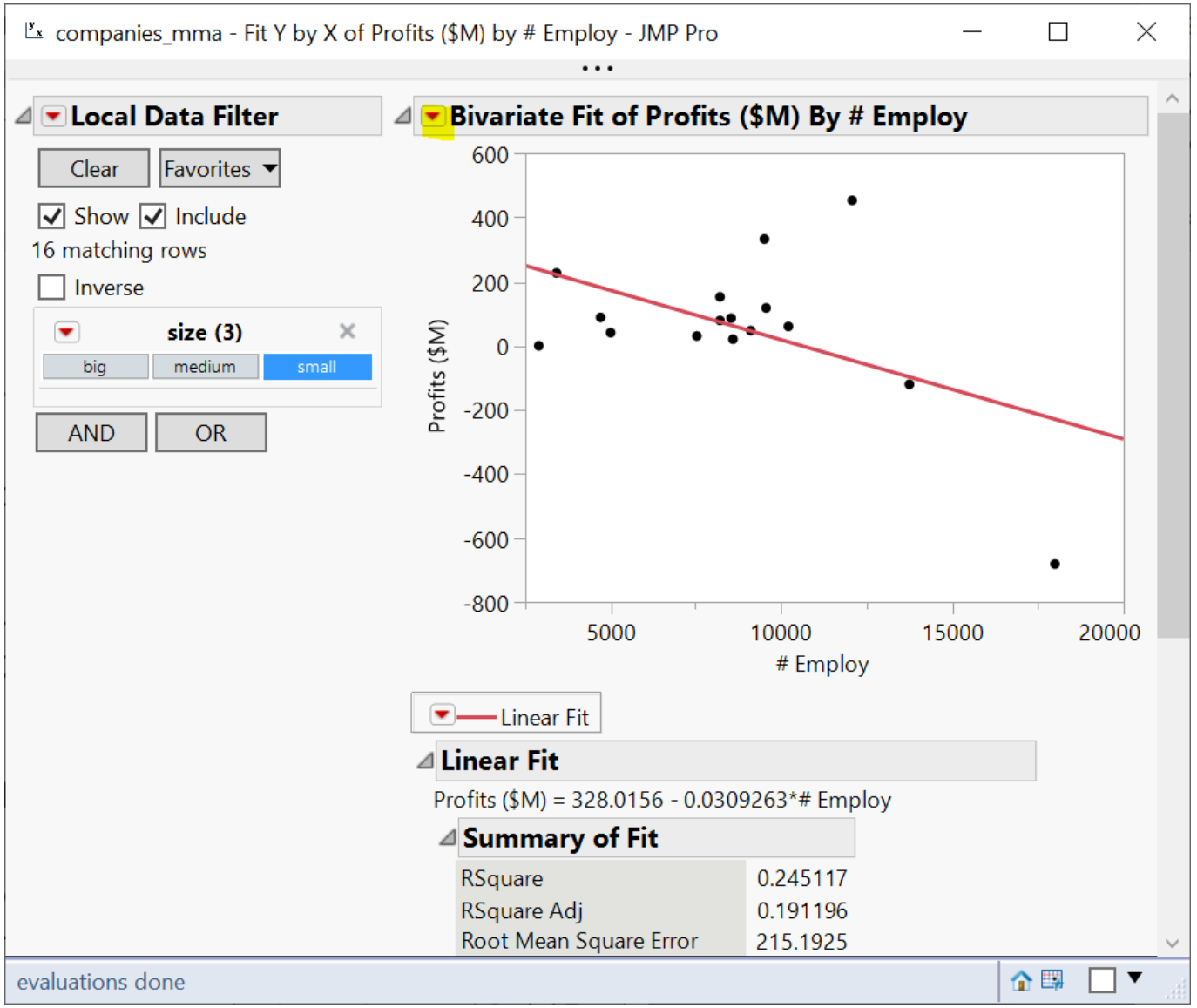




https://www.jmp.com/support/help/en/15.2/#page/jmp/the-data-filter.shtml#

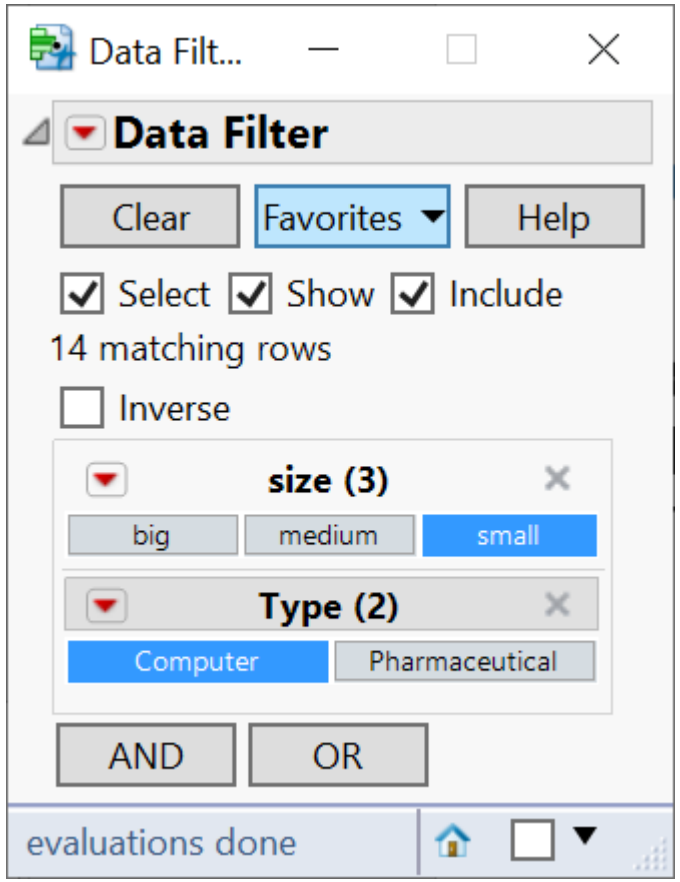
Filter Rows (Demo)

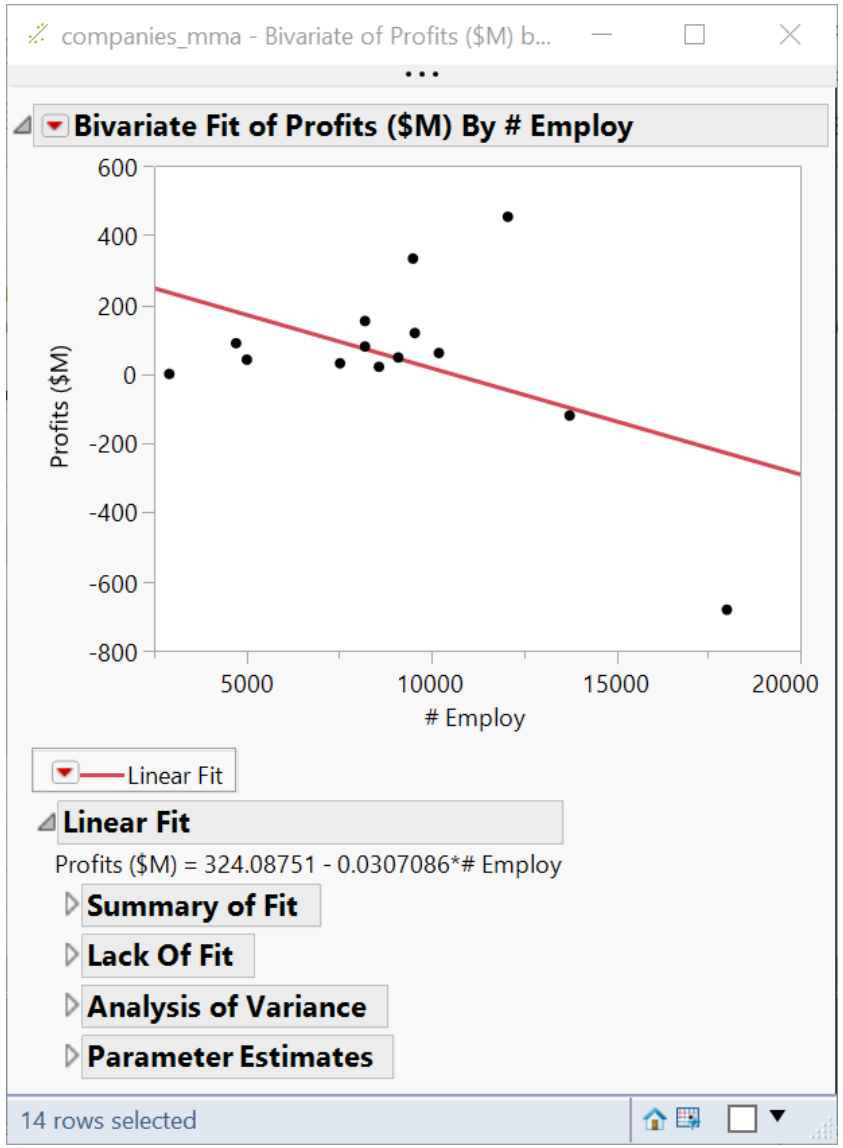
- Local Data Filter
  - only affects the report where the filter is enabled



Your Turn (Hands-on)

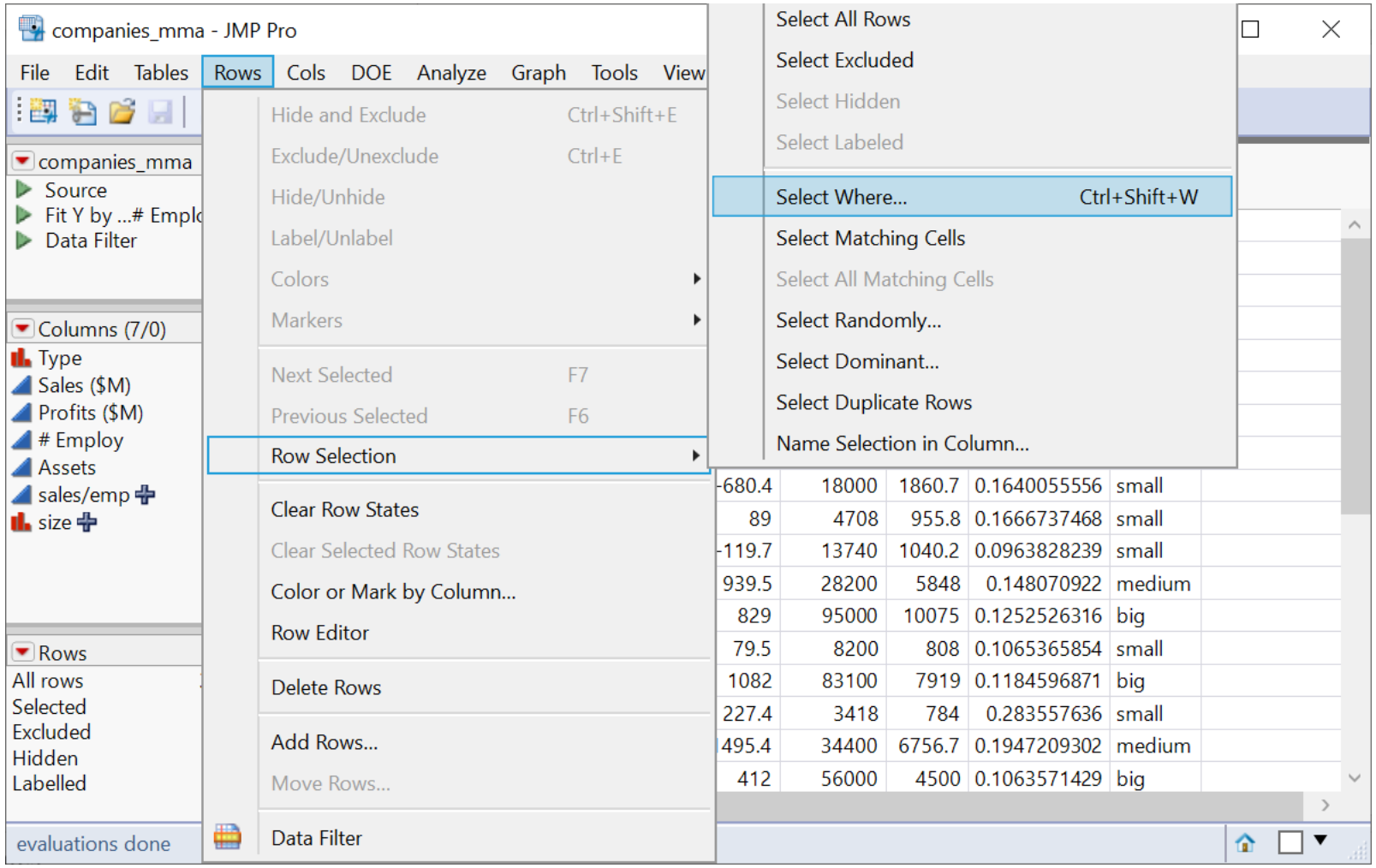
- Create a data filter based on size & Type
  - either global or local
- Explore the filter in a linear regression analysis
- Save the filter script
- Explore adding a continuous col into the filter





Filter Rows (Demo)

- Rows > Row Selection > Select Where…



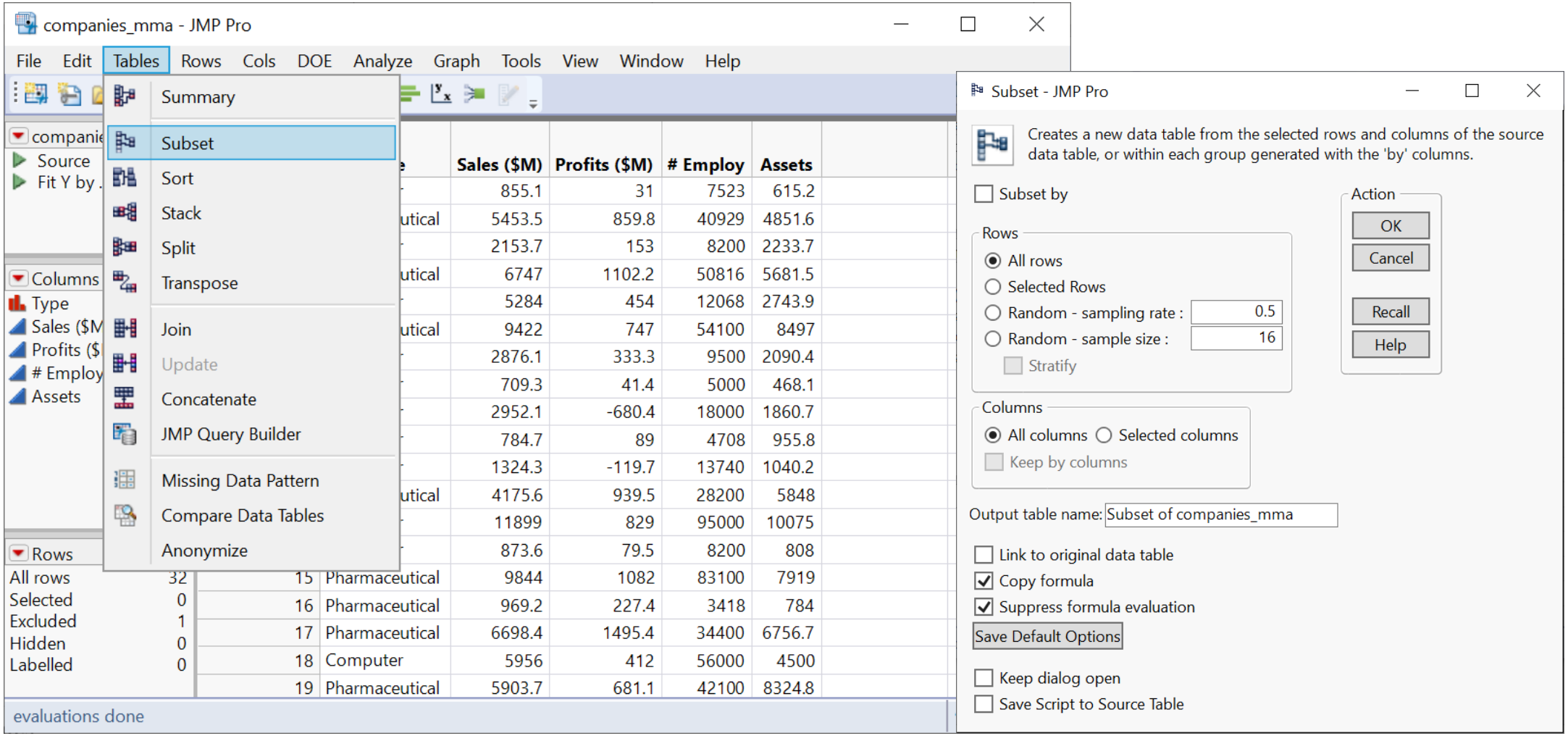
Data Manipulation - Basics

- Cols
  - select columns
  - add new columns

- Rows
  - order/sort rows (see table operation)
  - filter rows (have tried excluding certain rows)

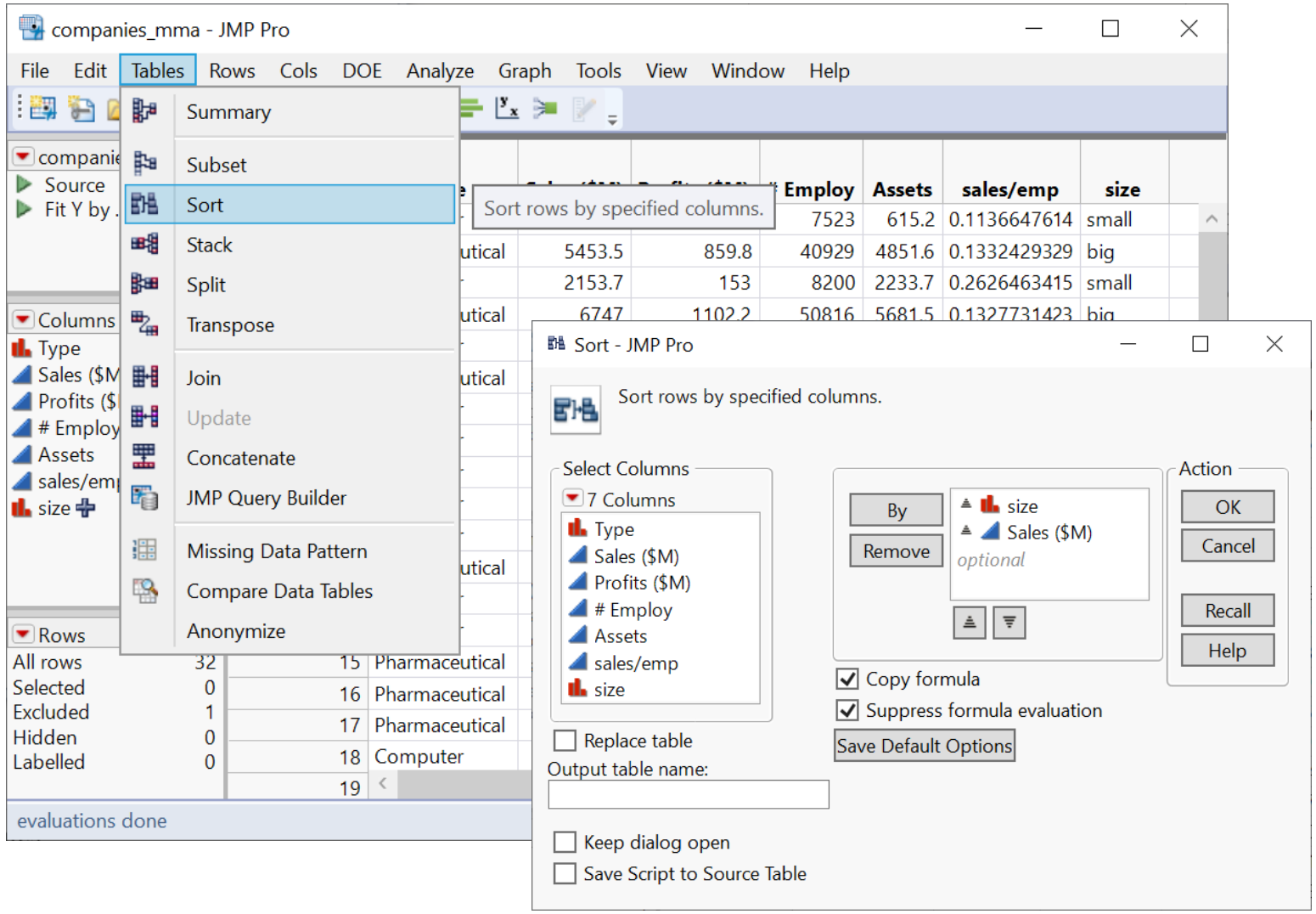
- **Tables**
  - subset a table
  - sort a table
  - aggregate/summarize (by group)

Subset a table (demo)



Sort Table / Order Rows (demo)

- Order rows by
  - a single column
  - multiple columns

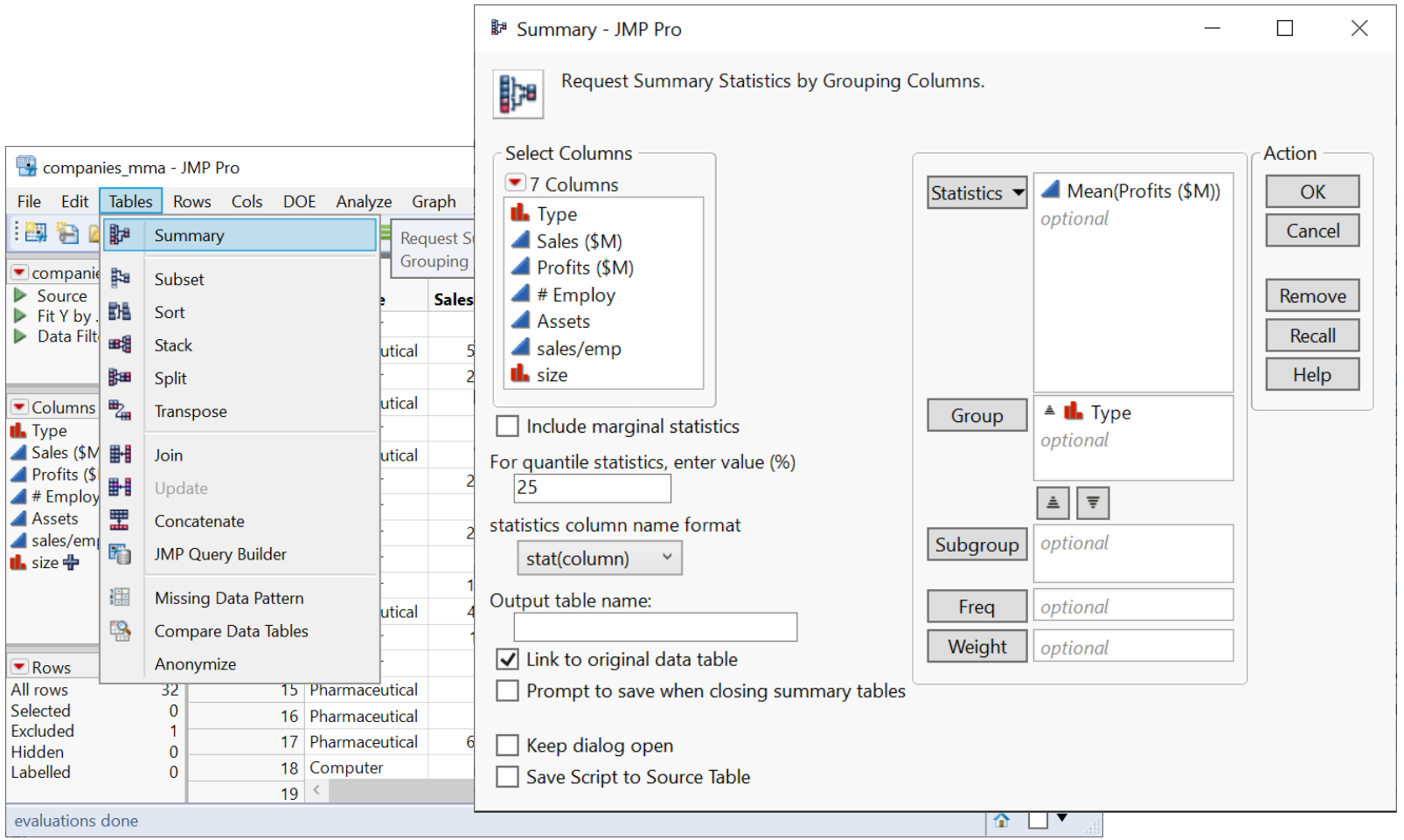


Your Turn (Hands-on)

- What’s the maximum Sales ($M) a “small” firm makes?

Aggregate / Summarize (by Group) (Demo)

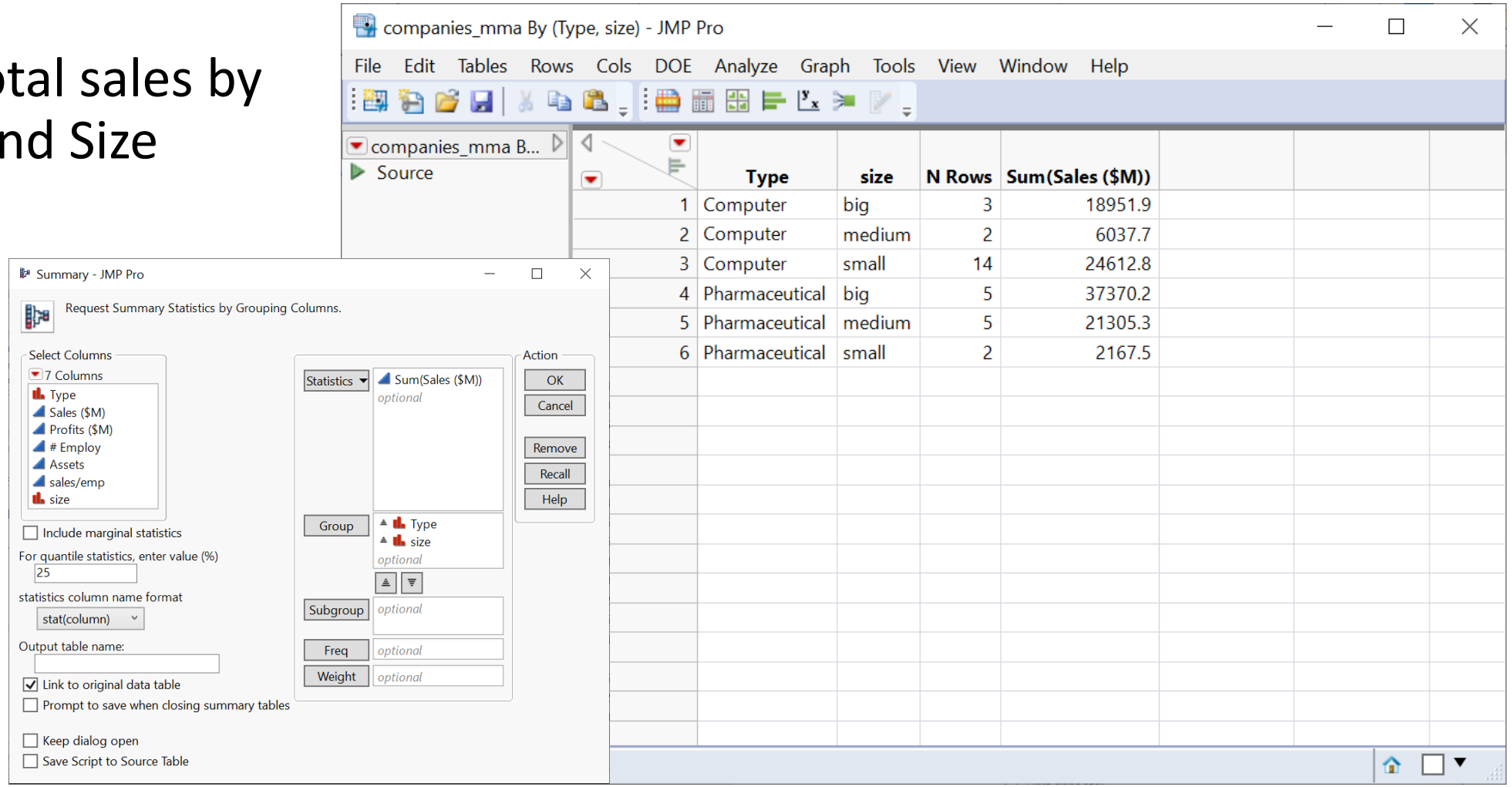
- Tables > Summary
- Find average profit by Type



https://www.jmp.com/support/help/en/15.2/#page/jmp/summarize-data.shtml#

Your Turn (Hands-on)

- Find total sales by Type and Size



Aggregate / Summarize (by Group) (Demo)

- Analyze > Tabulate
- Tabulate (red triangle) > Make into data table