Budgeting and Quantifying Data

Clerk’s Institute 2016
What is a Worksheet?

• A way to collect and organize information into columns and rows
  – Each column is lettered
  – Each row is numbered
• Information is entered into the cells
• Every cell has a unique reference or address, for example, A10, ZM799
Why Use Excel?

- A worksheet is big
- Perform calculations, create and recalculate scenarios quickly and accurately
  - Change data
  - Manipulate data
  - Reorganize information
- To create charts from worksheet data
Cursor Shapes

If the cursor is this shape

This will happen when you click and drag

“thick cross” = selecting cells

“down arrow” = selecting column(s)

“right arrow” = selecting row(s)

“thin cross” = AutoFill, copy

“double headed arrow” = resizing

“four headed arrow” = move, drag and drop
Navigating in a Spreadsheet

• **Mouse**
  - Scroll, point, click

• **Keyboard and key strokes**
  - Enter
  - Tab
  - Arrow keys
  - Home/End

• **Other**
  - Name box
  - Ctrl + G (Go To)
Selecting Cells

- **Cell Range** = single cell or contiguous cells (forms a square or a rectangle)
  - Click and drag (thick cross)
  - Shift+Arrow keys or Shift+Click
  - Control+Shift+Arrow keys or End
  - Name box
    - Type range (A1:D10), press enter
    - Colon (:) means “through”

- **Entire row or column**
  - Click on column or row heading
  - Ctrl or Shift + Space Bar

- **Non-contiguous**
  - Use the Ctrl key
  - Select the first range/cell THEN use Ctrl to select the next range(s) – don’t start with the Ctrl key down

- **Entire spreadsheet or data set**
  - Select All button
  - Ctrl + A (sometimes twice)
Entering Data

• Click in cell and type
• While cursor is in the cell, you are in EDIT mode
• Enter numbers and dates for use in formulas
  – May appear differently on the worksheet versus the formula bar
• Special “text” cases
  – Zip codes, phone numbers, years, other “descriptors”
  – Start with an ‘ (apostrophe) to indicate text
• To complete the entry
  – Press Enter or Ctrl + Enter
  – Press Tab
  – Click the “green check mark”
Editing Data

• To overwrite ALL data in a SINGLE cell, select cell and begin to type
• To use EDIT mode, activate the cell for editing first
  – Click on the cell and press F2
  – Double click on cell
  – Click on cell then click in formula bar
• In EDIT mode use the backspace and arrow keys to move around within the cell’s contents
• To delete contents of a cell or cell range, press the DELETE key (NOT backspace)
• To cancel/undo
  – Press ESC if still in edit mode
  – Ctrl + Z if no longer in edit mode (already pressed enter)
Entering Formulas

• Create formulas to perform calculations

• Process
  – Click in the cell where the result should appear
  – Begin the formula with an = then
    • Create the remainder of the formula using numbers, dates, cell references and operators (+, -, /, *, &)
    • Can use the percent symbol (%) for percentages
  – IMPORTANT: upon completion, press Enter, Ctrl + Enter or the ✓ in the formula bar

• Use the keyboard, mouse or both to create the formula (be careful – don’t be a happy clicker!), and remember: ESC is your friend
More on Entering Formulas

• Standard rules of precedence followed (PEMDAS)
  – Examples
    • =5+2*3 Result = 11
    • =(5+2)*3 Result = 21
    • =((c5+g7)*60%)+2500
    – But don’t use parenthesis unnecessarily: =A1+B1, not =(A1+B1)
• Use cell references when
  – The formula structure will be the same, but it will be used with different cells
    (A1 + B1 uses the same structure as A2 + B2)
  – When you want to change data in a cell(s) that the formula refers to in order
    to see the effects of that change on the result (“what if” scenarios)
  – Any instance when raw numbers/original values may change
• Double check your results!
  – Verify data entry accuracy
  – Test with sample data (be careful)
  – F2 or double click in cell with result to verify structure
• Edit a cell with a formula the same way you edit a cell with text
  (F2, double click or use formula bar)

Sweet keystroke: Ctrl + ~ will toggle between show results and show formula
Inserting and Deleting Rows, Columns and Cells

- Rows are inserted above the active cell, columns are inserted to the left of the active cell.
- Not really “inserting” or “deleting”...
- Home Ribbon | Cells Group
- **Alt + IR** (insert row) or **Alt + IC** (insert column)
- Right click
  - Column letter or row number
  - Cell or cell range
- When deleting a cell(s), Excel will want to know what to do with the surrounding cells
- RECHECK FORMULAS!!
Formatting Rows and Columns

- Column width and row height
  - #==========#
  - Double click column or row border
  - Drag column or row border
  - Home Ribbon | Cells Group | Format Button
  - Effects columns to the left and rows above

- For multiple columns, rows or whole spreadsheet, select first
General Formatting Guidelines

- Type in data first, do formatting last
- Deleting the contents of a cell does not remove the formatting from the cell
- Once formatting is placed on a cell, the formatting will continue to be used until it is changed or removed using:
  - Home Ribbon | Editing Group | Clear
  - Home Ribbon | Cells Group | Format
  - Other formatting buttons in Home Ribbon
- When a cell is copied or cut, the formatting goes with it, to change use:
  - Paste Options
  - AutoFill Options
  - Other formatting buttons in Home Ribbon
Formatting in the Home Ribbon

- Alignment can be horizontal and vertical
- Merge and center
  - Type text in one cell, highlight cells to be merged
  - Cells may be difficult to move to other areas of the sheet
    - do this last
- Currency, percentage and comma buttons are not “on/off” buttons
  - Change to “General” or “Number” to remove formats
  - Clear formats in Home Ribbon | Cells Group
- Decimal buttons also round
- Drawing borders allows for customized borders
- More Number Formats...for specialized data (phone number, SSN, etc.)
- Format Cell = Ctrl + 1
Printing

• Ctrl + P goes to Print Preview where most print options can be changed
  – Common commands already available
  – Use Page Setup for more customized settings
    • Margins: centering
    • Header/Footer: add common information such as date and page numbers and customize
    • Sheet: set print titles and print area (MUST use Page Layout Ribbon for these), grid lines and column and row markers

• Page Layout Ribbon also has print options...but need to go to Print Preview to see the results of any changes

• To specify a range
  – Page Layout | Page Setup Group | Print Area Button
  – Settings in Print Preview
Freezing Panes

- View Ribbon | Window Group | Freeze Panes
- Freeze Panes
  - Used to freeze rows and columns simultaneously
  - Freezes rows above and columns to the left of the active cell
  - If active cell is A1, window is frozen in the middle
- Regardless of position in the worksheet
  - Freeze Top Row freezes top row only
  - Freeze First Column freezes first column only
Sorting Data

- Cautions
  - Is the data clean?
    - Empty rows, columns and cells can cause problems – Excel might not recognize where the data begins and where it ends
  - Are labels included?
    - Labels are usually recognized and used as options to sort by
    - If recognized, labels will not be included in the sort process
  - Should data in each row stay together?
    - Selecting more than one cell, row or column causes only information in that range to be sorted – the surrounding cells will not be included in the sort
    - When a single column or row is selected, and there is other data around the column or row, Excel will ask about expanding the sort range to keep records together
  - When in doubt, select the data to be sorted first, and use the Data Ribbon|Sort & Filter Group, Sort button

- Sort buttons
  - Sorts by column
  - If the data is clean, records (rows) *usually* stay together
  - Click in any cell in the column – do NOT select entire columns

- Data Ribbon|Sort & Filter Group, Sort button
  - Cursor can be anywhere in the data
  - If a single cell is selected, Excel guesses at the cell range
  - If more than one cell is selected, only cells in selected area will be sorted
  - Header row can be indicated
  - Ascending, descending or custom
  - Multiple levels of sorting
  - Options (sort by row)

- Can use filters (Ctrl + Shift + L)
Parts of a Workbook

• By default, there are three worksheets in a new workbook
• To make a worksheet active click on the sheet tab
• Navigate with Ctrl + Page Up/Page Down
• Use scrolling arrows when sheet tabs cannot be seen
• Click on new sheet tab to insert new sheet or Shift + F11
Using Multiple-Sheet Workbooks

- Separate information onto different pages (worksheets) in an Excel file (workbook)
- Organize, manage and consolidate information
- Work with sheet tabs to
  - Insert: right click
  - Delete: right click
  - Rename: double click
  - Move/Reorder: drag and drop
  - Copy: Ctrl + drag and drop
What is a Function?

- A function is a substitute for entering lengthy or complicated formulas
- Excel’s function categories include

<table>
<thead>
<tr>
<th>Database</th>
<th>Information</th>
<th>Math &amp; Trig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date &amp; Time</td>
<td>Logical</td>
<td>Statistical</td>
</tr>
<tr>
<td>Financial</td>
<td>Lookup &amp; Reference</td>
<td>Text</td>
</tr>
</tbody>
</table>
The Sum Function

- Replaces A1+B1+C1+D1 with \texttt{\=sum(A1:D1)}
- Procedure: select cell(s) where result should appear
  - Type in formula
  - Alt + =
  - Type and use mouse or keyboard
  - Select multiple cells, type formula, press Ctrl + enter
  - Formulas Ribbon | Function Library Group | AutoSum Button
- AutoCalculate
  - Located in the status bar
  - Quick calculations without entering a function
  - Does not get stored anywhere
Function Basics

- = function name followed by the argument(s) in parenthesis
- Parenthesis always required; some functions have no arguments
- Arguments are separated by a comma
- Use quotes when specifying text, including spaces
- When nesting use the same number of left and right parenthesis
- Read it like a word problem
- Date and time functions may require reformatting

=SUM(A1:D1)
Entering a Function

- **Methods**
  - Insert Function button
  - Formulas Ribbon | Function Library Group | AutoSum Button
  - More Functions...from AutoSum button
  - Type = and first letter, list pops up

- **Provides list of functions**
- **The Function Arguments dialog box**
  - Activated by clicking on the Insert Function button
  - “Fill in the blanks”
  - Bold text means required
  - Result is shown
VLOOKUP

- Returns a value from one data set (D1/table array) to another data set (D2) based on a value that exists in both data sets
  - **lookup_value**
    - The value that exists in both data sets, select it from D2
  - **table_array**
    - The first column MUST contain the lookup value
    - Do not need to select all data in D1 only the range which includes the lookup value and the value you want returned
    - Best practice: sort in ascending order by the lookup value column (required if working with numeric values) and name the range
  - **col_index_num**
    - The column in the table array which contains the data you wish to display in D2
    - Column LETTERS are irrelevant, the first column, containing the lookup value is always column 1 – start counting from there
    - It does not matter where the table is located n the worksheet
  - **range_lookup**
    - Optional argument; best practice: always use it
    - TRUE: approximate match, used primarily for numeric ranges
    - FALSE: exact match, used primarily for text
AutoFill Feature

- Copies contents (formula, text, numbers) in any direction
- If cell references are used, they change, or “adjust” when copied across or down (unless absolute)
- Allows you to quickly enter a series or sequence of data that follows a pattern
- Drag the fill handle of the cell or range
- Paste options button
  - Depending on type of data, options will be different
  - Fill Without Formatting uses formatting of destination cell

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Quarter 1</td>
<td>Quarter 2</td>
<td>Quarter 3</td>
<td>Quarter 4</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Jan-97</td>
<td>Apr-97</td>
<td>Jul-97</td>
<td>Oct-97</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Relative Cell Addresses

• A cell reference that changes in a formula, relative to the direction in which it is copied
  – If a formula is copied left or right, COLUMN references change (row references do not)
  – If a formula is copied up or down, ROW references change (column references do not)
• Default when mouse or keyboard is used to enter references in formulas
Copying Formulas Using Relative Addresses

\[ (b5+c7) \times d9 \]

Becomes this when copied down

\[ (b6+c8) \times d10 \]

Becomes this when copied across

\[ (c5+d7) \times e9 \]

COLUMNs Change

ROWS Change
Absolute and Mixed Cell Addresses

• A cell reference in a formula that does not change when the formula is copied or cut
• In the reference, the column and/or row is preceded by a dollar sign
  – Type the $ sign or
  – Select the reference(s) and press the F4 key
• The $ “locks” the column and/or row and it cannot change when copied
• Reference will change when
  – Rows or columns are inserted
  – Data in a referring cell is moved
• Why use absolute references?
  – For CLARITY and EFFICIENCY
    • Creating formulas that continually reference the same cell(s), such as a “constant”
    • It is easier to understand and update a calculation when the values used can be seen and referenced on the worksheet
  – Because results will be INCORRECT if mixed or absolute references are not used
Copying Formulas Using Absolute or Mixed Addresses

\[ (b5 + c7) \times d9 \]

Only COLUMNS change when copied across, so:
- Rows 5, 7 and 9 would never change when copied across
- Columns B and C are locked/absolute, and will not change
- Column D becomes column E because it is not locked/absolute

Only ROWS change when copied down, so:
- Columns B, C and D would never change when copied down
- Rows 5 and 9 are locked/absolute, and will not change
- Row 7 becomes row 8 because it is not locked/absolute
Types of Cell References

• Relative: A1
  – Columns change when copied across (becomes B1)
  – Rows change when copied down (becomes A2)

• Absolute: $A$1
  – Neither columns OR rows change when copied across or down (remains $A$1)

• Mixed: A$1 (only row is locked)
  – Column changes when copied across (becomes B$1)
  – Row does not change when copied down (becomes A$1)

• Mixed: $A1 (only column is locked)
  – Column does not change when copied across (becomes $A1)
  – Row changes when copied down (becomes $A2)
Using Business Graphics

• Most people are visual learners
  – Graphics clarify
  – Graphics are easier to interpret (or at least they should be!)
• Graphics are produced in a variety of formats to suit specific needs
**Line Charts:** Plots trends or show changes over a period of time

**Bar or Column Charts:** Compare one data element with another data element

**Pie Charts:** Used to show the proportions of individual components compared to the total

**Scatter Plot Charts:** Shows how one or more data elements relate to another data element
Principles of Business Graphics

• Simplicity: Only use graphics that help to clarify your point
• Unity/Relational: Graphics must clearly relate to the data
• Emphasis: Use emphasis sparingly to draw attention to certain elements or trends
• Balance: Ensure balance within the chart and in relation to the page
Elements in a Chart

- Plot Frame
- Plot Area
- Y-Axis (series or value)
- Y-Axis Title
- Chart
- Chart Frame
- Title
- Subtitle
- Legend
- Data Series
- X-Axis Title
- X-Axis (category)

Pro Bean Counters Assoc.
Annual Wage By Age

Dollars

15-20 yrs | 21-30 yrs | 31-40 yrs | 41-50 yrs | 50+ years

USA
Canada
England
Australia
Chart Fundamentals

- **X-axis: “category or label”**
  - Describes what is being plotted
  - Examples – date, location, product, name
  - Two categories result in one being used on the X-axis and one being used in the legend

- **Y-axis: “series or value”**
  - Quantifies whatever you are plotting
  - Examples – dollars, percentage, number of units, cost
  - Whatever is entered as values is plotted as the series points and is used to establish the range used on the Y-axis
• Organizing the data is the most important step
• With one set of labels and data points information can be placed in columns OR rows
• With two sets of labels, put one set of labels in a column and one set in a row
• Don’t label things that should not be labeled, and watch out for empty columns/rows

One set of labels and data

Two sets of labels and data
<table>
<thead>
<tr>
<th>Column</th>
<th>In columns or rows, like:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar</td>
<td>Lorem Ipsum</td>
</tr>
<tr>
<td></td>
<td>1 2</td>
</tr>
<tr>
<td></td>
<td>3 4</td>
</tr>
<tr>
<td>Line</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td></td>
</tr>
<tr>
<td>Radar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Or:</td>
</tr>
<tr>
<td></td>
<td>Lorem Ipsum</td>
</tr>
<tr>
<td></td>
<td>1 3</td>
</tr>
<tr>
<td></td>
<td>Ipsum 2 4</td>
</tr>
<tr>
<td>Pie</td>
<td></td>
</tr>
<tr>
<td>Doughnut</td>
<td></td>
</tr>
<tr>
<td>(with one series)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A 1</td>
</tr>
<tr>
<td></td>
<td>B 2</td>
</tr>
<tr>
<td></td>
<td>C 3</td>
</tr>
<tr>
<td></td>
<td>Or:</td>
</tr>
<tr>
<td></td>
<td>A B C</td>
</tr>
<tr>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td>Pie</td>
<td></td>
</tr>
<tr>
<td>Doughnut</td>
<td></td>
</tr>
<tr>
<td>(with more than one series)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A 1 2</td>
</tr>
<tr>
<td></td>
<td>B 3 4</td>
</tr>
<tr>
<td></td>
<td>C 5 6</td>
</tr>
<tr>
<td></td>
<td>Or:</td>
</tr>
<tr>
<td></td>
<td>A B C</td>
</tr>
<tr>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td></td>
<td>4 5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>XY (scatter)</th>
<th>In columns, placing x values in the first column and corresponding y values and/or bubble size values in adjacent columns, like:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

| Bubble       | |
|--------------| |

<table>
<thead>
<tr>
<th>Stock</th>
<th>In columns or rows in the following order, using names or dates as labels: high values, low values, and closing values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>High</td>
</tr>
<tr>
<td>1/1/2002</td>
<td>46.125</td>
</tr>
<tr>
<td>Or:</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>1/1/2002</td>
</tr>
<tr>
<td>High</td>
<td>46.125</td>
</tr>
<tr>
<td>Low</td>
<td>42</td>
</tr>
<tr>
<td>Close</td>
<td>44.063</td>
</tr>
</tbody>
</table>

| Doughnut     | |
|--------------| |
Creating a Chart

• Charts can be created as a separate sheet in a workbook
• Charts can be embedded on an existing worksheet, which gets layered, similar to a graphic image
• Select the data range to be charted, including labels
• If the range in non-contiguous, use the Ctrl key
• Insert Ribbon|Charts Group
Design Ribbon | Data Group

- Switch Row/Column button to swap what is in the legend with what is on the X axis
- Select Data button to reorganize, add and delete data series and names
  - Use add and remove to add or remove series from the chart
  - Use Edit to add a name in the legend or change series selection

Labels used on the X axis
Name used in the legend
Data range used in chart
Data points
With chart selected, Design and Format Ribbons become available, providing options for customizing and editing chart.
Formatting shortcut buttons become are on the chart and expand to provide further formatting options.
Printing a Chart

• A Chart Sheet
  – Design | Location Group | Move Chart Button to place in separate sheet
  – Select the chart sheet to print

• An Embedded Chart
  – If nothing is selected, all data and the chart will print
  – To print only the chart, select the chart
What is a Pivot Table?

A way to organize, filter and summarize large amounts of data without effecting or rearranging the original data.
The Terminology

• **Source list:** where the data comes from
  - Excel file
  - External database
  - Another pivot table
  - Crosstab table in Excel

• **Field:** a category of data (usually organized in columns in the original worksheet), which contains a limited number of unique entries
  - Row or Column Field: describes layout of table
  - Page Field: filters overall table
  - Data Field: the data you wish to summarize (salary, age, sales); must be numeric

• **Item:** an element in a field (a cell)
Fields =
- **Page**: Education Level
- **Column**: M/F (gender)
- **Row**: Source of Employment

<table>
<thead>
<tr>
<th>Source of Employment</th>
<th>M/F</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>$45,600</td>
<td>$42,643</td>
</tr>
<tr>
<td>CR</td>
<td>$36,550</td>
<td>$38,970</td>
</tr>
<tr>
<td>ER</td>
<td>$47,367</td>
<td>$49,463</td>
</tr>
<tr>
<td>JF</td>
<td>$37,800</td>
<td>$41,737</td>
</tr>
<tr>
<td>US</td>
<td>$48,050</td>
<td>$48,092</td>
</tr>
<tr>
<td>WI</td>
<td>$42,233</td>
<td>$46,088</td>
</tr>
<tr>
<td>Grand Total</td>
<td>$42,525</td>
<td>$45,230</td>
</tr>
</tbody>
</table>
Creating a Pivot Table

- Have at least one set of data that has a limited number of types of entries
- Label each field
- Place the cursor somewhere in the data set
- Insert | PivotTable and PivotChart Report
- Select data source
- Use field area to drag and drop fields
- Format by selecting field once it is placed here

- Enables direct drag and drop onto the table
- Pivot Table Button | Options | Display Tab – Classic Pivot Table
- Can also drag to field area

Modify with Options and Design Ribbons
Formatting and Modifying

- Pivot table toolbar
- Right click
- Double click
- Use pull down arrows to remove fields
- Drag and drop to add and remove fields