B&E 105: Technology for Business Solutions
Exam 1 Checklist & Outline

Strategy for doing well: Work along with the videos, filling out your Excel file(s) step by step. Do this until you can comfortably complete the file without any help from these notes or the videos themselves. By the time you sit for the exam, you should have been able to complete the Excel practice file(s) perfectly *several times* without assistance.

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□□□ = to start a formula
□□□ * / ^ + - ( )
□□□ Filing down formulas
□□□ Relative references
□□□ Absolute references
□□□ Mixed references
□□□ Cell formatting
□□□ EXP
□□□ SUM
□□□ MAX
□□□ MIN
□□□ DAYS

□□□ COUNT
□□□ AVERAGE
□□□ AutoSum
□□□ Common error messages
□□□ Fixing auto-formatted dates
□□□ Formatting, width, gridlines, freezing
□□□ Excel tables
□□□ Sorting and multiple sorts
□□□ Filtering
□□□ Scatter plots
□□□ Histograms
□□□ Chart elements

1. **Simple Calculations (~14:40)**
   - = to start a formula
   - * to multiply (Shift+8)
   - / to divide
   - ^ for exponents (Shift+6)
   - + for addition
   - - for subtraction
   - ( ) for numerators, denominators, exponents, and bases as needed

2. **Cell References (~23:51)**
   - Reference a cell by entering the name in the formula or by clicking a cell after you have begun entering a formula
   - Drag down or double click bottom right corner to fill down a formula
   - **Relative reference**: the default when referencing cells; the location of the relative reference cell changes when the formula is filled down or across (Ex: "=B2")

- **Absolute reference**: a reference to a cell that is not allowed to change from a set cell when the formula is filled down or across (Ex: "=B2")
- **Mixed reference**: a reference whereby the column or row of a cell is fixed while the corresponding row or column is allowed to vary when the formula is copied down or across (Ex: "=$B2" or "=B$2")
- Either enter "$" in the appropriate place for an absolute or mixed reference or click within the formula and press the F4 key to cycle through reference options
- Formatting a cell:

Home Tab ►Number ⬊ ►Category ► Number

3. **Excel Functions (~24:41)**
   - The function wizard fx allows for searching and selection of functions.
   - Basic Excel functions, some available through the "Σ AutoSum" button in the Editing section of the Home tab. Note that the [ ] indicates an optional argument for the function in this and all future formula descriptions:

Function	Definition
=EXP(*number*)	Exponential function.
=SUM(*number1*, [*number2*], …)	Sums the entered numbers or cell references.
=SUM(*range*)	Sums the cells in the selected range.
=MAX(*number1*, [*number2*], …)	Returns the largest number of the entered numbers or cell references.
=MAX(range)	Returns the largest number in the selected range.
=MIN(*number1*, [*number2*], …)	Returns the smallest number of the entered numbers or cell references.
=MIN(*range*)	Returns the smallest number in the selected range.
=DAYS(*end_date, beg_date*)	Returns the number of days between the ending date and beginning date.
=COUNT(*range*)	Returns the number of cells in the range that contain numbers (in the Σ AutoSum options).
=AVERAGE(*range*)	Returns the average of the numbers in the selected range (in the Σ AutoSum options)

- "Σ AutoSum" sums or performs a function on numeric adjacent cells. Check to be sure that this function selects only the cells you want.
- Autoformatted dates can be fixed by selecting:

Home Tab ►Number ⬊ ► Category ► General ►OK

- Common error messages:

Error Message	Meaning
#####	Column is too narrow. Adjust width.
#DIV/0	Attempt to divide by 0.
#NAME?	Excel doesn't recognize function. Check spelling of function.
#NUM!	The wrong type of numeric data is used for an operation.
#REF!	Invalid reference.
#VALUE!	Incorrect input for a function.
#N/A!	Formula can't find the referenced data.

4. S&P 500 (~18:40)

- Formatting:
    - Double click or drag between column headings to adjust column width
    - Show or hide gridlines, headings, and the formula bar by checking or unchecking boxes in the "Show" group of the "View" tab
    - Freeze panes by selecting the first row or column you don't want to freeze, or the cell to the bottom right of the area you want to freeze, then:

    View Tab ►Window ► Freeze Panes ► Freeze Panes

- Excel Table
    - Select your data, then click Table on the *Insert* tab. Check the "My table has headers" box if the first row of the data contains headings.
    - Sort by selecting ⬇ in a heading cell.
    - Multiple sorts:

    ⬇ ►Sort by Color ► Custom Sort ► Add Level

    - Filter by selecting ⬇ and then checking/unchecking what you want visible/hidden

5. Yield Curve (~22:54)

- Scatter plot: select your data, then

    Insert Tab ►Charts ►

- Histogram: select your data, then

    Insert Tab ►Charts ►

- o Double click the axis to make changes to bins (number, width, overflow, and underflow)
- Formatting:
  - o On the Home tab in the *Font* and *Alignment* groups, text can be merged across cells Merge & Center , borders can be added , and cells can be shaded .
  - o Chart elements (including axes) can be added by selecting the chart and clicking the + in the upper right corner.
  - o Right click on column or row headers in a spreadsheet and select *Insert* to insert a column or row.

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□□□ Mixed, absolute, relative references
□□□ ROUND
□□□ ROW
□□□ MOD
□□□ MOD(ROW(),2)
□□□ Naming cells
□□□ Conditional formatting
□□□ Generate series (drag down values)
□□□ Protect Cells
□□□ Concatenate
□□□ Show/hide ribbon
□□□ Auto calculation on/off
□□□ Superscripts, centering, and formatting

□□□ Alternating row colors using MOD
□□□ Insert graphs, scatter plots
□□□ Formatting graphs, labels
□□□ Goal seek
□□□ Add a series to a graph
□□□ Concatenate with ROUND
□□□ Data validation of cells
□□□ Add graphics file
□□□ Add developer tab
□□□ Record macro and add button
□□□ Save as a macro enabled file
□□□ All previous exam material

1. Tools, Part 1 (~26:45)

Function	Definition
=ROUND(*number*, *num_digits*)	Rounds the number or cell reference to the selected number of digits.
=ROW([*reference*])	Returns the row of the cell referenced. If no reference, returns the row of where the formula is placed.
=MOD(*number*, *divisor*)	Returns the remainder after the given number or reference is divided by the divisor.
=MOD(ROW(),2)	A ROW function nested in a MOD function. Returns a 0 for even rows and a 1 for odd rows.

- Naming cells:
  - Select a cell and then change the name in the Name Box in the top left corner, just above the spreadsheet. Press *Enter*.
  - Alternatively, change or search for a cell name in the Name Manager:

    Formulas Tab ► Defined Names ► Name Manager ► New *or* Edit

- Excel will follow a pattern of two or more cells when filling data down (generating a series).
- Conditional formatting:

    Home Tab ► Styles ► Conditional Formatting ► Highlight Cell Rules

2. **Tools, Part 2 (~18:21)**
   - Protecting Cells
     - By default, all cells are locked upon protecting the sheet
     - To change if a cell is locked or unlocked:

        Home Tab ► Alignment ▣ ► Protection

     - To protect the sheet (and enable locked cells):

        Review Tab ► Changes ► Protect Sheet

     - To unprotect the sheet once protected

        Review Tab ► Changes ► Unprotect Sheet

   - Concatenation
     - Begin concatenation cell with an =
     - Use " " for text in a concatenation
     - Use & to add text or formulas by concatenation
     - Example: ="The value in the cell to the left is "&ROUND(C44, 2)&"."
       - Note that there is a space after *is* in the text
       - An & precedes each bit that is to be concatenated (before both the ROUND function and the period).
       - Quotes are not needed around numbers, references, or formulas, but they are needed around text
       - The period is also text, so it has quotes around it as well.
       - Don't forget to close out quotes (that is, if you have **"** you must be sure you have **"**.)
   - Hiding the Ribbon
     - Right click on the and check "Collapse the Ribbon."
     - Click any tab (*Home, Insert, Draw,* etc.) to reveal the ribbon, and right click again, unchecking "Collapse the Ribbon" to bring the ribbon back.

- You can also double-click any tab to reveal or hide the ribbon. The up arrow and the thumbtack in the lower right corner of the ribbon can also be used to collapse or pin the ribbon.
- Auto Calculations
  - To turn off auto calculations:

    Formulas Tab ► Calculation ► Calculation Options

  - To calculate once manual calculations are on:

    Formulas Tab ► Calculation ► Calculate Now

3. **Make the Table (~21:09)**
- General Formatting
  - Create an exponent by highlighting the number in a cell, then:

    Home Tab ► Font ⬓ ► Superscript

  - To apply formatting to an entire row or column, select the entire row by clicking the row heading (a number) or column heading (a letter)
  - Centering, font changes, alignment, and borders options can be found in the *Font* and *Alignment* sections on the *Home* tab.
- Alternating row colors in a table
  - Use the MOD and ROW functions

  Home Tab ► Styles ► Conditional Formatting ► New Rule ► Use a Formula

  - For even formatted rows: =MOD(ROW(),2)=0
  - For odd formatted rows: =MOD(ROW(),2)=1
  - Choose the formatting using the *Format* button, and check the *Preview* window
  - To change a rule:

    Home Tab ► Styles ► Conditional Formatting ► Manage Rules

4. **Make the Graph (~23:41)**
- Scatter plot: select your data, then

  Insert Tab ►Charts ►

- Formatting the graph
  - Double click axis labels. In the "Format Axis" menu that comes up on the right side of the screen, click , and max/min bounds, units, tick marks, label position, and decimal places can be adjusted.
  - Axes labels can be formatted in the same way text in a cell is in the Font section of the Home tab.
  - Select the table and click to add, remove, or edit chart elements, including axes titles, gridlines, and legends.

- To make a line dashed, select the line, then click ⬚. Click the radio button next to the "Solid line" option, then choose from the dashed option in the *Dash type* menu below.
- Adding a series to graph:
  - Select the table and click ⬚ ►Select Data ►Add, then enter series name and select X and Y values.
- Goal Seek

Data Tab ► Forecast ► What-If Analysis ►Goal Seek

  - Goal Seek is used to find an input value given a result. In our example, it is used to find the supply and demand equilibrium.
  - To find where demand equals supply, use Goal Seek to set the difference cell (demand – supply) equal to zero by changing the value of the quantity cell.
- Data Validation

Data Tab ► Data Tools ► Data Validation

  - Data validation allows you to restrict the values that may be entered in a cell.
  - In our example, we allow any *decimal* value (in the *Allow* drop down list of the Data Validation window) between a minimum and maximum.
  - Error messages can accompany data validation restrictions on the "Error Alert" tab of the Data Validation window.

5. **Clean Up (~20:22)**
- Adding graphics

Insert Tab ► Illustrations ► Pictures ► *(navigate to picture file)*

- Change row and background colors
  - First select the row you want to color, then:

Home Tab ► Font ► ⬚

  - For a specific color, select the small down arrow next to the icon and choose More Colors ► Custom
- Add developer tab

File Tab ► Options ► Customize Ribbon ► *(check box next to "Developer")*

  - Alternatively, right click on a blank spot of the ribbon and choose "Customize Ribbon"
- Record macro and assign to a button
  - Must have the developer tab enabled

Developer Tab ► Code ► Record Macro

- Provide a macro name, shortcut key, and description. Once you click "OK" the recording begins.
- Be sure to only record what is necessary. Don't use undos/redos, and limit clicks to as few as possible.
- To stop recording, click "Stop Recording" where you originally clicked "Record Macro."
- To add a button:

  Developer Tab ► Controls ► Insert ► Button (Form Control)

- Drag and drop to place button, and then assign a macro to it in the window that pops up.
- Text in the button can be edited by right clicking.

- Save as macro enabled

  File Tab ► Save As ► Browse ► Save as type ► Excel Macro-Enabled Workbook

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□□□ Mixed, absolute, relative references
□□□ Wrap Text
□□□ Merge & Center
□□□ Center Across Selection
□□□ Currency format
□□□ IF
□□□ VLOOKUP
□□□ Group/Ungroup Rows
□□□ Hide zero value cells
□□□ Box & Whisker Chart
□□□ Format a sheet (background colors)

□□□ Change cell names
□□□ Add spinner
□□□ Cell borders
□□□ *Annual Savings* calculation
□□□ *Annual Withdrawal* calculation
□□□ *Total Savings* calculation
□□□ *Inflation* calculation
□□□ *Inflation Adjusted Initial Salary* calc.
□□□ Hide/Unhide columns and rows
□□□ All previous exam material

1. **Tools, Part 1 (~19:49)**

Function	Definition
=IF(*logical_test*, [*value_if_true*], [*value_if_false*])	Returns a given value or statement based on the outcome of the *logical_test*.
=VLOOKUP(*lookup_value*, *table_array*, *col_index_num*, [*range_lookup*])	Searches the **left-most** column of a **sorted** table (the *table_array*) for a value you specify (*lookup_value*) and returns the corresponding value in the column you specify (*col_index_num*).

- Word wraps:
    o Wrap text- auto adjusts the height of the cell to fit text to the column's width

    Home Tab ► Alignment ► Wrap Text

- Merge & Center- joins adjacent cells and centers text within the cell

  Home Tab ► Alignment ► Merge & Center

- Center Across Selection- centers text across selection without joining cells

Home Tab ► Alignment ▣ ► *Alignment* tab ► Horizontal ► Center Across Selection

- Currency format- preferred over the "Accounting $" format when hiding zeros

  Home Tab ► Number ▣ ► Currency ► (*choose symbol*)

- IF statements
  - =IF(*logical_test*, [*value_if_true*], [*value_if_false*])
  - The logical test can use >, <, =, <=, <=, as well as +, -, *, and /
  - The logical test can also use cell references and include equations
  - Be sure that [*value_if_true*] and [*value_if_false*] have quotes around them if they are words or phrases

- VLOOKUP
  - =VLOOKUP(*lookup_value*, *table_array*, *col_index_num*, [*range_lookup*])
  - There are several important requirements of this function
    - ***The table must be sorted***
    - ***The lookup value must be in the leftmost column***
    - ***Mixed and absolute references ($) are needed when copying the formula down or across***
  - The *table_array* is the entire table where the value you are looking for is supposed to be.
  - The *col_index_num* is the column of the table in which the value you are looking up resides. The first column is "1", the second column is "2" and so on. The *col_index_num* will never be "1", because this is the column where the *lookup_value* is.

2. **Tools Part 2 (~21:28)**
  - Grouping Rows
    - Select all rows you'd like to be hidden, then

      Data Tab ► Outline ► Group (or Ungroup)

  - Hide Zeros
    - Notice the cell must be *exactly* zero to be hidden, not just a small number (0.0000001 may show as 0.00)

File ► Options ► Advanced ► Display options for this worksheet ► (check/uncheck) Show a zero in cells that have zero values

- Change the name of a cell

    Formulas Tab ► Defined Names ► Names Manager ► Edit

- Add a spinner
    - First, add the spinner

    Developer Tab ► Controls ► Insert ► Form Control ►Scroll Bar (or Spin Button)

    - Drag the cursor to place the spinner.
    - Right click to resize.
    - Right click then select *Format Control* to select minimum and maximum values, incremental changes, and the cell that you wish to change (the *Cell link*).
- Box and Whisker
    - Select the row (or rows) of data, including the heading, then:

    Insert Tab ► Charts ► Insert Statistic Chart ► Box and Whisker

    - The shaded rectangle displays the middle 50% of observations, from the 25th to 75th percentiles.
    - The line in the shaded rectangle is the median.
    - The X is the mean (average).
    - The whiskers extend from the max to the min (although outliers may be above or below).
    - To remove outliers, right click the plot, then:

    Format Data Series ► (uncheck *Show outlier points*)

3. **Inputs (~20:30)**
   - Selecting the entire sheet: click the ◹ in the upper left corner of the sheet.
   - To select a border: *Home* Tab ► Font ►Outside Borders
   - To select multiple items, hold down the *Ctrl* key and click multiple items.
   - Note that the *Retire at Age* means you will work *through* that age. That is, if *Retire at Age* is 65, you work for one year after your 65th birthday, retiring just before you turn 66.

4. **Career Savings (~27:20)**
   - Be able to calculate the following, using IF statements where appropriate:
       - Annual Savings
       - Annual Withdrawal
       - Total Savings
       - Inflation
       - Inflation Adjusted Initial Salary
   - Note that each of the Career Savings calculations and formulas require the use of absolute references (that is, they refer to a *named* cell).
   - The *Accounting* format doesn't hide zeros.

5. <u>Outputs (~12:26)</u>

- Be able to use a VLOOKUP to find values from a retirement table
- Hide (unhide) columns or rows by right clicking the column/row header and selecting *Hide* (*Unhide*)

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□□□ VALUE
□□□ COUNTIF
□□□ WEBSERVICE
□□□ FILTERXML
□□□ Copy and pasting from the web
□□□ Insert data from the web
□□□ PivotTable
□□□ Pie chart

□□□ Hi, Lo, Close stock chart
□□□ Open, Hi, Lo, Close stock chart
□□□ Reordering tabs
□□□ VLOOKUP
□□□ The value by stock of a portfolio
□□□ The value by sector of a portfolio
□□□ General formatting (previous sections)
□□□ All previous exam material

1. **Tools, Part 1 (~18:25)**

Function	Definition
=VALUE(*text*)	Converts a number stored as text in Excel to a number.
=COUNTIF(*range, criteria*)	Counts the number of cells that meet a given condition. Note that *criteria* needs to be in quotes or refer to a cell. Items that meet this criterion will be counted.
=WEBSERVICE(*url*)	Returns data from the given URL, if that URL supports Excel's webservice function.
=FILTERXML(*xml, xpath*)	For the purposes of this course, filters the output of the WEBSERVICE function. The *xml* input will refer to the WEBSERVICE cell, and the *xpath* will be from a table of codes.

- VALUE
  - Numbers stored as text cannot be recognized by Excel to perform actions such as MAX, MIN, or AVERAGE.
  - Numbers may be stored as text when pasting from the web.

- o Excel may indicate which numbers are stored as text with a small green triangle at the top left corner of the cell.
  - o Use the VALUE function (see above chart) to convert to a number from text.
- COUNTIF
  - o Used when you'd like to count the number of items in a table that are greater than, less than, or equal to a certain number (or equal to a certain word or phrase).
  - o See the description in the table above.
  - o Note that if you want to know the number of times the range includes a number greater than 100, you'd have to type ">100" *including the quotation marks* as the criteria.
  - o If, however, you use a cell reference that contains >100 *without quotation marks*, you do not need to insert them.
- WEBSERVICE
  - o From the table above, note that the URL needs to be in quotes.
  - o Recall how to concatenate:
    - ▪ If you'd like to refer to a cell before the *.xml* at the end of the WEBSERVICE function, insert "& &" *including the quotes* in front of *.xml*
    - ▪ Click the cursor between the & signs and then select the appropriate cell as a reference.
- FILTERXML
  - o From the table above, the cell reference is the cell with the WEBSERVICE output.
  - o The *xpath* will be "*//code*" *including the quotes* where *code* is from a list.
  - o In the video example, the *code* was *weather* or *temp_f* or *temp_c* to provide a weather description, the temperature in Fahrenheit, or the temperature in Celsius.
  - o A table of *codes* will be provided on the exam. No need to memorize the list, but you must be able to know how to use the codes.
- Copying and pasting from the web
  - o Drag and drop the cursor across a table online, starting outside the box if necessary.
  - o Pasting directly may paste all the source formatting.
  - o To paste just the text:

Home Tab ► ► Match destination formatting
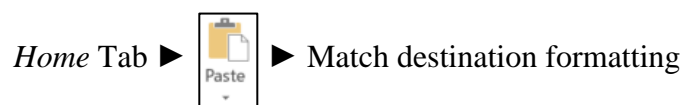
2. <u>Tools Part 2 (~18:33)</u>
- Insert data from the web
  - o WEBSERVICE is useful, but requires the website to have the data in a format Excel understands.
  - o Copy/paste from the web is simple, but is more difficult to update.

- Inserting data from the web by this method allows for data to be easily updated:

Data Tab ► Get Data ► From Other Sources ► From Web ► *paste in URL* ► *select a table* ► *select down arrow next to the* Load *button* ► Load to… ► Existing worksheet ► OK

- In some versions, you select *New Query* from the Data tab
- To refresh the table, right click the table and select Refresh

- PivotTable
  - Select a table, including the headers:

  Insert Tab ► Tables ► PivotTable ► *select where you'd like the table*

  - Click the PivotTable, then select the fields you'd like displayed in the pane that appears on the right of the screen.
  - To delete a PivotTable, select the entire table and then press the Delete key on your keyboard.
- Pie Chart
  - Select the column headers

  Insert tab ► Charts ► Insert Pie or Doughnut Chart ► *select Pie under "2D Pie"*

- COUNTIF
  - Remember to use relative, mixed, and absolute references as needed

3. **Make the Table (~17:38)**
   - Reorder tabs by dragging and dropping to the desired location
   - Formatting from previous videos
     - Background colors
     - Text colors
     - Wrapping text
     - Column width
     - Centering
     - Double click between columns to autofit
   - Borders
     - To add borders around cells or selection:

   Home tab ► Alignment � ► *Border* tab ► *select color of border and where you'd like the border*

   - VLOOKUP
     - As in previous examples, be sure to use absolute references when appropriate
     - Be sure to only make the necessary clicks when you need to select a range on a different worksheet.
   - Open-High-Low-Close and High-Low-Close

- o Select the Date column, hold the CTRL key, then select the columns *Open, High, Low, Close* or *High, Low, Close*.
- o Select Insert►Charts►Waterfall or Stock Chart►High-Low-Close *or* Open-High-Low-Close
- o For the High-Low-Close, the bars show the range of the stock for the day (high and low), the dash shows the Close. For the Open-High-Low-Close, the bars present the range for the stock price over the day. The rectangles represent the open and close, with dark shading meaning the top value is the open and the bottom is the close (the stock went down on the day). White rectangles mean the top value is the close and the bottom is the open (the stock went up on the day).

4. PivotTable (~13:43)
- • Conditional Formatting and Cell Rules
  - o First, select the data you want to apply the rules to, then:

Home tab ► Styles ► Conditional Formatting ► Highlight Cell Rules ► Greater Than (Less Than)

  - o Choose the value above or below which you want to have the rule apply.
  - o Select the formatting you'd like from the drop-down list.
  - o Custom options for formatting can be selected from the drop-down list as well.
  - o Manage rules by selecting *Manage rules* under the *Conditional Formatting* drop down list that appears.
    - ▪ You must have selected the data where you have conditional formatting applied to manage rules.
    - ▪ Select the rule, then select the *Edit Rule* button.
- • Conditional Formatting and Arrows
  - o First select the data you want to apply the rules to, then:

Home tab ► Styles ► Conditional Formatting ► Icon Sets

  - o Once you add arrows, you will need to *Manage rules* by the above procedure to set the values above and below which you'd like to have the icon appear. You can also change the icon as appropriate.
- • Refresh PivotTable by right clicking anywhere in the table and selecting *Refresh*
- • Remember to use the appropriate relative, mixed, and absolute references for COUNTIF functions

5. Pie Chart (~6:12)
- • Recall that the value of a position is the number of shares you hold multiplied by the share price. If you are asked to present a pie chart showing the value in each stock, you would want to select the name (or ticker) column and the *value* column.
- • If you are asked for the value held in each sector, you'd select the sector column and the *value* column of the *PivotTable*.

- For the purposes of a pie chart, the share price and the number of shares aren't very important. The value in each stock or in each sector is what matters.
- Move the legend of a pie chart by selecting the pie chart, clicking the plus sign at the top right, and selecting the right arrow next to the *Legend* button (be sure *Legend* is checked).
- Remember formatting methods from previous sections
    - Remove gridlines/headings
    - Collapse the ribbon

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Strategy for doing well: Work along with the videos, filling out your Excel file(s) step by step. Do this until you can comfortably complete the file without any help from these notes or the videos themselves. By the time you sit for the exam, you should have been able to complete the Excel practice file(s) perfectly *several times* without assistance.

Checklist: These topics may appear on the exam. Check them off as you learn them. (Notice that there are multiple checkboxes for each!) Anything covered in the videos can be tested. The format of the exam is like that of the practice file(s).

□□□ Nested IF functions
□□□ Sparklines
□□□ Inserting comments
□□□ Show formulas
□□□ MATCH
□□□ INDEX
□□□ INDEX(MATCH())
□□□ Data Validation (list)
□□□ Text to columns
□□□ SUBSTITUTE
□□□ Paste values
□□□ Sorting a data table
□□□ LARGE
□□□ SMALL
□□□ Chart with two vertical axes
□□□ Transposing data
□□□ TRANSPOSE
□□□ TODAY
□□□ NOW

□□□ WEEKNUM
□□□ NETWORKDAYS
□□□ WORKDAY
□□□ Trace Precedents/Dependents
□□□ Remove duplicates
□□□ COUNT
□□□ COUNTA
□□□ SUMIFS
□□□ Printing
□□□ Text boxes
□□□ Insert shapes
□□□ Bring forward or back
□□□ Aligning text and shapes
□□□ Grouping
□□□ RAND
□□□ RANDBETWEEN
□□□ CHOOSE
□□□ Forecasting
□□□ All previous exam material

1. Tools, Part 1 (~20:28)

Function	Definition
=IF(*logical_test1*, [*value_if_true1*], IF(*logical_test2*, [*value_if_true2*], [*value_if_false2*]))	A nested IF function. Returns *value_if_true1* if *logical_test1* is true. If *logical_test1* is false, it performs *logical_test2* and returns *value_if_true2* if *logical_test2* is true and *value_if_false2* otherwise.
=MATCH(*lookup_value*, *lookup_array2*, [*match_type*])	Returns the row position of the *lookup_value* in the *lookup_array2*. Set

	match_type equal to 0 for the exact match.
=INDEX(*lookup_array*, *row_num*)	Returns the value in the *row_num* position of the *lookup_array*.
=INDEX(*lookup_array*, MATCH(*lookup_value*, *lookup_array2*, [*match_type*]))	Returns the value in the position obtained by the MATCH function in the *lookup_array*.

- *Nesting* of formulas in Excel involves putting one or more Excel formulas within another. In this video, we use nested functions for IF statements and for the INDEX(MATCH()) combination.
- Nested IFs
  - o Unlike a regular IF function, nested IFs allow for more than 2 outcomes as the result of performing a logical test.
  - o See the description in the above table. If the first IF statement is true, *value_if_true1* will be displayed. If the first IF statement is false, it will proceed onto the next IF statement, checking if that is true. If the second IF statement is true, *value_if_true2* will be displayed. If it is false, *value_if_false2* will be displayed.
  - o Thus, for a nested IF with 2 IF statements, there are 3 possible outcomes.
  - o Remember to put " " around text for your *value_if*s.
- Sparklines
  - o Sparklines show general trends of the highlighted data.
  - o You can drag down Sparklines if you are correctly using relative references.
  - o To add:

Insert Tab ► Sparklines ► Line

  - o Select the Data Range (what you want graphed) and where you want to place the Sparklines (the Location Range).
- Insert Comments
  - o Right click a cell and select *Insert Comment*.
  - o Cells with comments have a small red triangle in the top right corner.
  - o Comments can be edited or deleted by right clicking a cell with a small red triangle in the top right corner and selecting *Edit Comment* or *Delete Comment.*
- Show Formulas
  - o Press CTRL and ~ on your keyboard. The is just above the Tab key and under the Esc key on your keyboard
  - o Alternatively:

File Tab ► Options ► Advanced ► Display options for this worksheet ► *select "Show formulas in cells instead of their calculated results"*

- INDEX(MATCH())
  - o The =INDEX(MATCH()) function overcomes two big restrictions of the VLOOKUP function:
    - ▪ VLOOKUP looks up a value in the left most column of a table only.

- VLOOKUP requires that the data be sorted
    - See the table above for the exact syntax of this nested function. Notice that the INDEX function returns the value in the cell position that the MATCH function provides.
    - Note that *lookup_array* will contain the items that you want to have produced for you in a cell while *lookup_array2* is the column with the items you are looking for.
        - Example: Suppose you have a list of students in one column and a list of their exam scores in the next column in a spreadsheet. At the top of the spreadsheet you want to use the INDEX(MATCH()) function to create a cell that returns the exam score when you input a student's name. In this case, the *lookup_array* will be the column of exam scores and the *lookup_array2* will be the column of student names.
        - ***Be careful to include absolute references for the* lookup_array *and* lookup_array2 *if you plan on dragging down the function.***
- Data Validation (drop-down lists)
    - To create a drop-down list so that only select items can be input into a cell, first select the cell where you want the drop-down list, then:

Data Tab ► Data Tools ► Data Validation ► Settings ► *in the "Allow" drop down menu select "List"* ► *choose the values that you will allow using the "Source" box.*

2. Tools Part 2 (~19:14)

Function	Definition
=SUBSTITUTE(*text, old_text, new_text*)	Replaces the *old_text* of the *text* in a cell with *new_text*.
=LARGE(*array, k*)	Returns the kth largest value of the selected *array*
=SMALL(*array, k*)	Returns the kth smallest value of the selected *array*
=TRANSPOSE(array)	Converts a vertical range to a horizontal range and vice versa. The transposed data will have no formatting and update as the original range is updated. Press **CTRL** + **SHIFT** + **ENTER** to activate the function.

- Text to columns
    - We can split one column of data into two columns of data by:

Data Tab ► Data Tools ► Text to Columns

- o If the data is *delimited* by some constant space or symbol, select "Delimited" then "Next"
  - ▪ Sometimes we may need to "paste in" the space from the column instead of just choosing the "Space" delimiter.
  - ▪ Go to cell in the column you wish to split, highlight and copy the delimiter (or space), then proceed to the *Text to Columns* box
- SUBSTITUTE
  - o In our context, used to replace unwanted items in a cell with nothing, indicated with "" as the *new_text*.
- Paste Values
  - o Used to paste the results of a function without updating the values.
  - o Select the data to copy, then:

    Home Tab ► Clipboard ► Paste ► Paste Values

- Sorting a data table:
  - o Select the data of the table (*not* the headings). Then:

    Data Tab ► Sort & Filter ► Sort

  - o Choose the value that you want to sort on and the direction (ascending or descending).
  - o The sort does not update if the values are changed.
- LARGE and SMALL
  - o Unlike MAX and MIN, these allow you to choose the 1st, 2nd, 3rd,…, etc. largest and smallest values.
  - o Be sure to use absolute references for the array if you plan on dragging down the formula.
- Chart with two vertical axes
  - o To add a chart, select all the data and add, for example, a scatter as we have done in the past.
  - o Then, with the chart selected:

    Design Tab ► Type ► Change Chart Type ► Combo

  - o Choose for each series if you'd like a line, bar, or one of the other options.
  - o Check if you'd like a particular series to appear on a Secondary Axis.
- Transposing Data
  - o The goal of transposing data is to "convert" rows to columns or vice versa
  - o Select the data, copy, and choose "Transpose" under:

    Home Tab ► Clipboard ► Paste ► Transpose

  - o By this method, the transposed table does not update.
  - o The TRANSPOSE function transposes the data and allows the cells to update when the source values change, and there will be no formatting.

- If the data you are selecting has *n* rows and *k* columns, select a space that has *n* columns and *k* rows, starting at the top left corner of space you will be pasting in.
- Begin typing =TRANSPOSE(*select-your-original-data*)
- ***Press*** **CTRL** + **SHIFT** + **ENTER** ***on your keyboard. Pressing*** **ENTER** ***alone will not work.***

3. **Tools Part 3 (~11:48)**

Function	Definition
=TODAY()	No argument, returns the date.
=NOW()	No argument, returns the date and time.
=WEEKNUM(*serial_number*)	Returns the week number for the input *serial_number*.
=NETWORKDAYS(*start_date, end_date*)	Returns the number of working days between the *start_date* and *end_date*.
=WORKDAY(*start_date*, *days*)	Returns the serial number of the date that is the specified number of (work) *days* after the *start_date*
=COUNT(*array*)	Counts the number of cells in the *array* that contain numbers (not text).
=COUNTA(*array*)	Counts all non-empty cells in the *array*.
=SUMIFS(*sum_range*, *criteria_range1*, *criteria1,…*)	Adds the cells in the *sum_range* if they meet the *criteria1* in *criteria_range1*

- TODAY, NOW, WEEKNUM, NETWORKDAYS, WORKDAY
  - From the table above, we see that TODAY and NOW take no arguments and update upon saving the file or pressing F9 to refresh the worksheet.
  - Notice that NETWORKDAYS and WORKDAY have the *start_date* first, in contrast to DAYS
  - A *serial number* is a number that represents a date within Excel. The serial numbers began at 1 on January 1st, 1900 and count consecutively up to today.
- Trace Precedents, Trace Dependents
  - To observe relationships among cells using arrows:

  Formulas Tab ► Formula Auditing ► *Trace Precedents* or *Trace Dependents*

  - Click *Remove Arrows* just below *Trace Dependents* to remove the arrows
- To remove duplicates from a table, select the data and:

  Data Tab ► Data Tools ► *Remove Duplicates*

- COUNT and COUNTA
  - COUNT: counts the number of cells in a range with numbers
  - COUNTA: counts the number of cells in a range any text

- SUMIFS
  - Unlike SUMIF, allows for the selection of more than one criteria.
  - The *sum_range* includes the cells that you wish to sum given that the corresponding cell in the *criteria_range1* is equal to *criteria1*.
- Printing
  - Select the area you wish to print, then:

    Page Layout Tab ► Page Setup ► Print Area ► Set Print Area

  - You can clear the print area by the same method.

4. Tools Part 4 (~20:39)

Function	Definition
=RAND()	Selects a number randomly between 0 and 1, with any number equally likely to appear
=RANDBETWEEN(*bottom, top*)	Selects an integer (counting number) between *bottom* and *top*, with any number equally likely to appear.
=CHOOSE(*index_num*, *value1*, [*value2*],…)	Displays *value1* if *index_num* is 1. Displays *value2* if *index_num* is 2, and so on.

- Text boxes:

  Insert Tab ► Text ► Text Box

  - Text in a text box is not associated with a cell location and can be easily moved by drag and drop.
  - Text in a text box can be formatted with different sizes, fonts, and alignments.
  - The *Format* tab appears in the ribbon when you are working on your text box, allowing for more formatting options.
- Shapes:

  Insert Tab ► Illustrations ► Shapes

  - Shape formatting, bevel options, and shading/shadows are available on the *Format* tab in the *Shape Effects* section of the *Shape Styles* group.
  - Note that you must select the shape (or the text box) for the *Format* tab to appear.
- Grouping and alignment
  - To bring an item forward or back:

    Format Tab ► Arrange ► Bring Forward *or* Send Backward

  - Now, to align, stack the text box and shape, then

    Format Tab ► Arrange ► Align

- o And for grouping, select all objects and text you wish to group:

  Format Tab ► Arrange ► Group (*or* Ungroup)

  - o Grouped text and shapes allow you to move all grouped items together and copy/paste all grouped items together.
  - o Multiple groups can be aligned using the *Align* option as above after all groups are selected. For example:
    - ▪ Align Top
    - ▪ Distribute Horizontally
  - o Different groups can also be grouped together.
  - o Editing is still available to individual items within a group by double clicking what you wish to edit.
- • RAND and RANDBETWEEN
  - o RAND returns a decimal between 0 and 1 from the uniform distribution (all numbers between 0 and 1 are equally likely to be picked). It takes no arguments.
  - o RAND can be nested within an IF function to run a simulation of a coin flip.
  - o RANDBETWEEN randomly selects an integer between (and including) the values you specify.
  - o Pressing F9 on your keyboard will recalculate the RAND or RANDBETWEEN formulas.
- • CHOOSE
  - o Chooses a value from *values* listed in the formula (see above table).
  - o You can nest a RANDBETWEEN function to display text as an output rather than a number.
- • Forecasting
  - o Select your dates and values.

  Data Tab ► Forecast ► Forecast Sheet

  - o Excel outputs a chart with the values, forecast values, and upper/lower confidence bounds on a new sheet, in addition to those values in a table.
  - o Note that Excel forecasting is not perfect. The context matters. Excel can forecast negative interest rates even though this doesn't make much economic sense. Be sure that you interpret the forecast results carefully and think about what is reasonable.