

**B&E 105: TECHNOLOGY FOR BUSINESS SOLUTIONS**  
**EXAM 5 CHECKLIST & OUTLINE**

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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).

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|---|--|
| <input type="checkbox"/> Nested IF functions          | <input type="checkbox"/> WEEKNUM                     |
| <input type="checkbox"/> Sparklines                   | <input type="checkbox"/> NETWORKDAYS                 |
| <input type="checkbox"/> Inserting comments           | <input type="checkbox"/> WORKDAY                     |
| <input type="checkbox"/> Show formulas                | <input type="checkbox"/> Trace Precedents/Dependents |
| <input type="checkbox"/> MATCH                        | <input type="checkbox"/> Remove duplicates           |
| <input type="checkbox"/> INDEX                        | <input type="checkbox"/> COUNT                       |
| <input type="checkbox"/> INDEX(MATCH())               | <input type="checkbox"/> COUNTA                      |
| <input type="checkbox"/> Data Validation (list)       | <input type="checkbox"/> SUMIFS                      |
| <input type="checkbox"/> Text to columns              | <input type="checkbox"/> Printing                    |
| <input type="checkbox"/> SUBSTITUTE                   | <input type="checkbox"/> Text boxes                  |
| <input type="checkbox"/> Paste values                 | <input type="checkbox"/> Insert shapes               |
| <input type="checkbox"/> Sorting a data table         | <input type="checkbox"/> Bring forward or back       |
| <input type="checkbox"/> LARGE                        | <input type="checkbox"/> Aligning text and shapes    |
| <input type="checkbox"/> SMALL                        | <input type="checkbox"/> Grouping                    |
| <input type="checkbox"/> Chart with two vertical axes | <input type="checkbox"/> RAND                        |
| <input type="checkbox"/> Transposing data             | <input type="checkbox"/> RANDBETWEEN                 |
| <input type="checkbox"/> TRANSPOSE                    | <input type="checkbox"/> CHOOSE                      |
| <input type="checkbox"/> TODAY                        | <input type="checkbox"/> Forecasting                 |
| <input type="checkbox"/> NOW                          | <input type="checkbox"/> All previous exam material  |

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**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 <i>value_if_true1</i> if <i>logical_test1</i> is true. If <i>logical_test1</i> is false, it performs <i>logical_test2</i> and returns <i>value_if_true2</i> if <i>logical_test2</i> is true and <i>value_if_false2</i> otherwise.
=MATCH(lookup_value, lookup_array2, [match_type])	Returns the row position of the <i>lookup_value</i> in the <i>lookup_array2</i> . Set

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

- 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
  - Unlike a regular IF function, nested IFs allow for more than 2 outcomes as the result of performing a logical test.
  - 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.
  - Thus, for a nested IF with 2 IF statements, there are 3 possible outcomes.
  - Remember to put “ ” around text for your *value\_ifs*.
- Sparklines
  - Sparklines show general trends of the highlighted data.
  - You can drag down Sparklines if you are correctly using relative references.
  - To add:

*Insert* Tab ► Sparklines ► Line

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

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

- INDEX(MATCH())
  - 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( <i>text, old_text, new_text</i> )	Replaces the <i>old_text</i> of the <i>text</i> in a cell with <i>new_text</i> .
=LARGE( <i>array, k</i> )	Returns the $k^{th}$ largest value of the selected <i>array</i>
=SMALL( <i>array, k</i> )	Returns the $k^{th}$ smallest value of the selected <i>array</i>
=TRANSPOSE( <i>array</i> )	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 <b>CTRL</b> + <b>SHIFT</b> + <b>ENTER</b> 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*

- 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
  - In our context, used to replace unwanted items in a cell with nothing, indicated with “” as the *new\_text*.
- Paste Values
  - Used to paste the results of a function without updating the values.
  - Select the data to copy, then:
 

*Home* Tab ► Clipboard ► Paste ► Paste Values
- Sorting a data table:
  - Select the data of the table (*not* the headings). Then:
 

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

*Design* Tab ► Type ► Change Chart Type ► Combo
  - Choose for each series if you’d like a line, bar, or one of the other options.
  - Check if you’d like a particular series to appear on a Secondary Axis.
- Transposing Data
  - The goal of transposing data is to “convert” rows to columns or vice versa
  - Select the data, copy, and choose “Transpose” under:
 

*Home* Tab ► Clipboard ► Paste ► Transpose
  - By this method, the transposed table does not update.
  - 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( <i>serial_number</i> )	Returns the week number for the input <i>serial_number</i> .
=NETWORKDAYS( <i>start_date, end_date</i> )	Returns the number of working days between the <i>start_date</i> and <i>end_date</i> .
=WORKDAY( <i>start_date, days</i> )	Returns the serial number of the date that is the specified number of (work) <i>days</i> after the <i>start_date</i>
=COUNT( <i>array</i> )	Counts the number of cells in the <i>array</i> that contain numbers (not text).
=COUNTA( <i>array</i> )	Counts all non-empty cells in the <i>array</i> .
=SUMIFS( <i>sum_range, criteria_range1, criterial, ...</i> )	Adds the cells in the <i>sum_range</i> if they meet the <i>criterial</i> in <i>criteria_range1</i>

- 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 1<sup>st</sup>, 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 *criterial*.
- 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( <i>bottom</i> , <i>top</i> )	Selects an integer (counting number) between <i>bottom</i> and <i>top</i> , with any number equally likely to appear.
=CHOOSE( <i>index_num</i> , <i>value1</i> , [ <i>value2</i> ],...)	Displays <i>value1</i> if <i>index_num</i> is 1. Displays <i>value2</i> if <i>index_num</i> 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

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

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

- Grouped text and shapes allow you to move all grouped items together and copy/paste all grouped items together.
- Multiple groups can be aligned using the *Align* option as above after all groups are selected. For example:
  - *Align Top*
  - *Distribute Horizontally*
- Different groups can also be grouped together.
- Editing is still available to individual items within a group by double clicking what you wish to edit.
- **RAND** and **RANDBETWEEN**
  - **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.
  - **RAND** can be nested within an **IF** function to run a simulation of a coin flip.
  - **RANDBETWEEN** randomly selects an integer between (and including) the values you specify.
  - Pressing **F9** on your keyboard will recalculate the **RAND** or **RANDBETWEEN** formulas.
- **CHOOSE**
  - Chooses a value from *values* listed in the formula (see above table).
  - You can nest a **RANDBETWEEN** function to display text as an output rather than a number.
- **Forecasting**
  - Select your dates and values.

*Data* Tab ► *Forecast* ► *Forecast Sheet*

- 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.
- 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.