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**DESCRIPTION OF EXCEL ANALYSIS TOOLS AVAILABLE**

The table below lists some of the tasks you may wish to accomplish using Excel and some of the methods available to utilize.

<table>
<thead>
<tr>
<th>WHAT DO YOU WANT TO DO?</th>
<th>METHODS YOU CAN USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>View Matching Records:</td>
<td>• <strong>Filter</strong></td>
</tr>
<tr>
<td>• Compound Criteria.</td>
<td>Located under the “Data” tab. Filter allows you to hide records which do not match your criteria. Criteria can be matching or ranges of text, values, or dates. You can also filter by more than one column.</td>
</tr>
<tr>
<td>• No Statistical Data Needed.</td>
<td>• <strong>Advanced Filter</strong></td>
</tr>
<tr>
<td></td>
<td>Similar to the regular “Filter”, you would probably only use this if you are using the Database functions or wish to copy the matching records to another location.</td>
</tr>
<tr>
<td>View Matching Records:</td>
<td>• <strong>Filter &amp; Tables</strong></td>
</tr>
<tr>
<td>• Compound Criteria.</td>
<td>If you convert your database into a “Table”, there are “subtotal” functions you can easily use to place counts, averages, sums, etc., at the bottom of the table. If you combine this with the “Filter” function, the subtotals will up to display only matching criteria.</td>
</tr>
<tr>
<td>• Display Statistical Information.</td>
<td>• <strong>Database Functions with the Advanced Filter</strong></td>
</tr>
<tr>
<td></td>
<td>When using the Advanced filter, you can also use Excel’s database functions such as Dsum(), Daverage(), Dcount(), etc., to display statistical information.</td>
</tr>
<tr>
<td>Compute Statistical Information:</td>
<td>• <strong>PivotTables</strong></td>
</tr>
<tr>
<td>• No Criteria Needed.</td>
<td>Located under the “Insert” tab. PivotTables quickly summarize your data into a matrix consisting of a column heading and or row heading. PivotTables summary operators include Count, CountA(), Average, Sum, and Standard Deviation. PivotTables can be created on the same sheet or a different sheet from your database.</td>
</tr>
<tr>
<td>• Don’t Need to See Records.</td>
<td>• <strong>Tables</strong></td>
</tr>
<tr>
<td></td>
<td>If you convert your database into a table, there are “subtotal” functions you can easily use. The subtotal functions appear below the last row of the table (database).</td>
</tr>
<tr>
<td></td>
<td>• <strong>Count()</strong></td>
</tr>
<tr>
<td></td>
<td>Counts the number of cells in a given range which contains values. Ignores text and blank cells.</td>
</tr>
<tr>
<td></td>
<td>• <strong>CountA()</strong></td>
</tr>
<tr>
<td></td>
<td>Counts the number of cells in a given range which contains Values or Labels. Ignores blank cells.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Average()</strong></td>
</tr>
<tr>
<td></td>
<td>Finds the average if a range of cells. Ignores blanks cells and cells containing text.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Sum()</strong></td>
</tr>
<tr>
<td></td>
<td>Adds values in a range of cells together.</td>
</tr>
</tbody>
</table>
## WHAT DO YOU WANT TO DO?

### Compute Statistical Information:
- **Single Criteria Only.**
- Changing the criteria for the current answer does not change the previous ones.
- Don’t Need to See Matching Records.

One problem with *PivotTables* and *Tables* is that if you change your criteria, all of your solutions change. If you need to see the solutions to various different criteria at the same time, this can be a problem. While you can create multiple *PivotTables* and *Tables*, they both can eat up a lot of memory.

The functions to the right contain the criteria within the function and do not require you to filter the database. They can be typed within any cell.

### Compare Separate Columns
- **Complex Criteria.**
- Changing the criteria for the current answer does not change the previous ones.
- Don’t Need to See Matching Records.

### Use Multiple Criteria:
- **Complex Criteria.**
- Changing the criteria for the current answer does not change the previous ones.
- Don’t Need to See Matching Records.

If you have criteria based on more than one column, you don’t need to see the matching records, and you don’t want previous results to change when you filter your database, use the techniques listed to the right.

**Limitation:**
Note that all three functions to the right require 1 column of criteria and 1 corresponding column of data to count, average, or sum.

### METHODS YOU CAN USE

<table>
<thead>
<tr>
<th>Compute Statistical Information:</th>
<th>Methods You Can Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Single Criteria Only.</td>
<td>• <strong>CountIF()</strong> – Single Criteria</td>
</tr>
<tr>
<td>• Changing the criteria for the current answer does not change the previous ones.</td>
<td><em>Counts the number of cells whose contents match a single given criteria.</em> Works with text or values. For example: “Count all the cells that have the word “Female” in them”. Or “Count all the cells containing a value greater than 50”.</td>
</tr>
<tr>
<td>• Don’t Need to See Matching Records.</td>
<td>• <strong>AverageIF()</strong> – Single Criteria</td>
</tr>
<tr>
<td></td>
<td><em>Returns the average values in a range(s) of cells given a single given criteria.</em> For example: “Average all the cells that have the word “Female” in them”.</td>
</tr>
<tr>
<td></td>
<td>• <strong>SumIF()</strong> – Single Criteria</td>
</tr>
<tr>
<td></td>
<td><em>Sums the contents of cells containing values that match a given criteria.</em> For example: “Sum the expense accounts for Managers only.”</td>
</tr>
</tbody>
</table>

**IF()**
You may be tempted to use an *IF()* statement rather than *CountIF* or *AverageIF*; however, this won’t be possible without entering it as an Array formula. Array formulas are covered later.

<table>
<thead>
<tr>
<th>Compare Separate Columns</th>
<th>Methods You Can Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complex Criteria.</td>
<td>• <strong>IF() &amp; AND() &amp; OR()</strong></td>
</tr>
<tr>
<td>• Changing the criteria for the current answer does not change the previous ones.</td>
<td><em>If you need to compare different columns, you may wish to consider using an IF() statement. It can contains formulas, functions, and is capable of AND and OR conditions.</em></td>
</tr>
<tr>
<td>• Don’t Need to See Matching Records.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Use Multiple Criteria:</th>
<th>Methods You Can Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complex Criteria.</td>
<td>• <strong>CountIFS()</strong> – Multiple Criteria</td>
</tr>
</tbody>
</table>
| • Changing the criteria for the current answer does not change the previous ones. | *The difference between CountIF() and CountIFS() is that CountIFS() can have multiple criteria. For example: “Count the number of males over the age of 50.”*  
*Note that CountIFS() uses 1 criteria column and 1 column of data to count. It cannot count a block of data.* |
| • Don’t Need to See Matching Records. | • **AverageIFS()** – Multiple Criteria |
|                        | *The difference between AverageIF() and AverageIFS() is that AverageIFS() can have multiple criteria. For example: “Display the average salaries of males over the age of 50.”*  
*Note that AverageIFS() uses 1 criteria column and 1 column of data to average. It cannot average a block of data.* |

|                       | • **SumIFS()** – Multiple Criteria |
|                       | *The difference between SumIF() and SumIFS() is that SumIFS() can have multiple criteria. For example: “Sum the expense accounts for Managers and Directors.”*  
*Note that SumIFS() uses 1 criteria column and 1 column of data to average. It cannot average a block of data.* |
### WHAT DO YOU WANT TO DO?

**Complex Criteria & Compute Blocks of Data:**
- Complex Criteria.
- Changing the criteria for the current answer does not change the previous ones.
- Don’t Need to See Matching Records.
- Compute Blocks of Data.

If you need to perform computations on multiple columns of data using a column of conditions, then an Array function may be your solution. They are custom formulas that process the cells in ranges individually rather than in aggregate. Often, they can also be used to compute an answer that would take two or more steps in one formula.

### METHODS YOU CAN USE

- **Array Formulas**
  
  Array functions have two major advantages over many of the functions listed above:
  - They can perform their operations on blocks of data rather than a single column.
  - Because you design them yourself, they are very adaptable.
  - They can be combined with other functions.
  
  The disadvantages of array functions are:
  - They can be conceptually complex to create.
  - You must remember to press Control + Shift + Enter after typing or editing them for them to return to correct response.

  *Example:* You wish to count how many salaries are greater than the average salary.

---

### Summary of Tools Available and their Properties

<table>
<thead>
<tr>
<th></th>
<th>View Matching Records</th>
<th>Allows Single Criteria</th>
<th>Allows Multiple Criteria</th>
<th>Can Compute Statistical Information</th>
<th>Previous Results Stable when the Criteria Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Filter &amp; Tables</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>PivotTables</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Advanced Filter</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes *</td>
</tr>
<tr>
<td>Count()</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CountA()</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CountIF()</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CountIFS()</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Average()</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AverageIF()</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AverageIFS()</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Array Formulas</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*It is possible to create multiple criteria areas using the Advanced Filter. This will allow you to save your statistical results.*
EXPORTING A QUALTRICS SURVEY TO EXCEL (As a .CSV File)

This section covers some of the options available when exporting survey results as a .CSV file (Comma Separated Values) which can be read by Excel. To access the download area, follow these steps:

1. Login to Qualtrics.
2. Click the “View Results” tab.
3. Select the folder containing your survey.
4. Select your survey.
5. Click “Download Data”.

Prior to exporting, there are six options you will need to address. They are briefly listed here and are illustrated over the next few pages. A few additional options follow this section.

- **Questions to Export** – Would you like to export all of your questions or just specific ones?
- **Date Range** – Would you like to export all questions or just ones from surveys answered within a specific period?
- **Answer Representation** – For multiple choice questions, you can instruct Qualtrics to export the answer choices as they appeared on the survey or convert them to a numeric equivalent.
- or would you like to supply short descriptive names?
- **Recode Values** – This pertains to unanswered but seen questions. (Unseen questions would be ones which appeared on a branch the user didn’t go down or hidden through skip logic.) Unanswered questions appear as blank cells but you can have Qualtrics fill in a value instead.
- **Export Tags** – Above each column of answers, would you like Qualtrics to simply number each column?

Format – In this handout, the format we are exporting to is an Excel .CSV file but there are other possible formats you could use.
1. Select Questions
Use this area to specify the questions (and results) you would like to include in the export.
   - *All Questions* – Click this to export all questions.
   - *Control + Click* to select non-adjacent questions.
   - *Shift + Click* to select adjacent questions.

2. Date Range (Optional)
If desired, you can use this to specify that only responses within the given time period should be exported. Leave blank to export all responses regardless of the date they were recorded.

3. Answer Representation (Labels or Values)
For multiple choice questions, you can instruct Qualtrics to export the answer choices as they appeared on the survey or convert them to a numeric equivalent.

For example, let’s say you asked the question shown below.

```
What is your Major?
- Finance
- Marketing
- Accounting
```

**Answers as Labels** – If you export “as Labels”, the answer text appears in the column as shown to the right.

**Answers as Values** - If you select “Values”, then text answers are converted to numeric choices. For example, Finance is 1, Marketing is 2, and Accounting is 3 as shown to the left. Do not use “as Values” for *Constant Sum* questions because the answers will be meaningless.

4. Recode Values (Optional)
This pertains to unanswered but seen questions. (Unseen questions would be ones which appeared on a branch the user didn’t go down or hidden through skip logic.) Unanswered questions appear as blank cells but you can have Qualtrics fill in a value instead. To use this option, check the box and then type whatever characters you would like to appear in the download in the box.
5. **Question Numbers vs. Export Tags**

For exported surveys, you have the choice to export the question numbers or descriptive titles as column headings.

### Question Numbers

When you export to Excel, your question numbers will become the column headings for each response.

### Export Tags

If you would like something more descriptive than a number as your column heading, you can create an *Export Tag* for each question. An export tag is simply text or values which appear as the column heading for each question in your export. To create and utilize *Export Tags*, follow the steps below.

a. Go to the “Edit Survey” tab.
b. Click each question’s number and type as desired.
c. Go to the “View Results” tab
d. Click the “Download” data button.
e. Check “Yes” at “Export tags:”.

Note that if you created export tags but do not check “Yes” to use them as we did in step e, Excel will number each column using this format: V1, V2, V3, etc.

6. **Format**

In the final step, you need to click the Excel icon to export your survey as a .CSV (Comma Separated Values) which can be read by excel.

a. Click the “Excel” icon.
b. Excel will prompt you to either “Save” or “Open”.
   - Excel 2007 – Click either Save or Open.
   - Excel 2003 – Click Save and then open the file from within Excel.
MORE QUALTRICS EXPORT OPTIONS

There are a few other export options you may find useful, these include exporting shorter versions of your questions (Static Labels) and answers (Variable Naming) or recoding answers when exporting Answers as Values.

Static Labels (Shorter Exported Question Text)
For each survey response, the second row in Excel always contains the question text. For lengthy questions and matrix questions, this can be cumbersome because it isn’t easy to view the entire question on the screen. An alternative is to create a “Static Label” which is basically just a shorter version of the question which shows up in the export in place of the question text. Note that the responders still see the full question text in the survey.

For example, the matrix question shown to the right will normally export to Excel as shown below. Follow the steps below to create Static Labels.

1. Click the “Edit Survey” tab.
2. Click the question you wish to affect.
3. Click the question’s purple box.
4. Select “More Advanced Options”.
5. Click the “Preview & Label” tab.
6. Check “Specify a static label”.
7. Type a short title for the question.
8. Click “Save Question”.

Results of using Static Labels
When you export to Excel, the question text will be replaced with what you typed in the “Specify a static label” box.

Note that the person taking the survey will still see the full question text. Note also that unlike Export Tags, there is no option to turn this off or on for the export. If you wanted to export the full question text, you would have to go back to each question and check “Use Question Text”.

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Survey_Analysis_Using_Excel.docx
10/21/09
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Recode Values & Variable Naming (Shorter Answer Text or Number Recoding)

Earlier we mentioned that answers can be exported as the actual text answers the responder sees or as a numeric value. This section goes a little bit further by showing you how to export a shorter text description of the answer (Variable Naming) or if you are exporting as values, how to change the numbering (Recode Values).

Variable Naming (text)
In the images to the right, the “before” image shows how the answers would normally export as labels. The “after” image shows the same results only this time, Variable Naming was used to create the shorter answers of: Supportive, Enigmatic, and Mixed.
To export the variable names, you must export “Answers as Labels”.

Recode Values (numbers)
If you are exporting as values, you can use “Recode Values” to control what those values would be. The Before image on the left shows how the answer exported as values but not recoded would appear. The After image shows how the answers would appear after recoding.
If you use Recode Values, you must export “Answers as Values” to see them.

See the next page for instructions on how to setup both “Recode Values” and “Variable Naming”.

Which of the following best describes your experience working at Globex-Thermodynamics, Inc?
- The company was always on the level. Mr. Scorpio encouraged employees to ask questions and responding in a timely and concise manner.
- The company sent out memos outlining their current plans but they were sometimes in conflict with what actually went down. When we had questions, answers were often confusing. Wonderful dental plan however.
- Rarely was what we were told and reality a match. Memos were infrequent and unclear. Any questions were strongly discouraged. I had know idea we were really building a doomsday machine.

Before “Variable Naming”

<table>
<thead>
<tr>
<th>K</th>
<th>V11</th>
<th>Which of the following best describes your experience working at Globex-Thermodynamics, Inc?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The company was always on the level. Mr. Scorpio encouraged employees to ask questions and responding in a timely and concise manner.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The company sent out memos outlining their current plans but they were sometimes in conflict with what actually went down. When we had questions, answers were often confusing. Wonderful dental plan however.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rarely was what we were told and reality a match. Memos were infrequent and unclear. Any questions were strongly discouraged. I had know idea we were really building a doomsday machine.</td>
</tr>
</tbody>
</table>

After “Variable Naming”

<table>
<thead>
<tr>
<th>K</th>
<th>V11</th>
<th>Which of the following best describes your experience working at Globex-Thermodynamics, Inc?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Supportive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Enigmatic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mixed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supportive</td>
</tr>
</tbody>
</table>

Before “Recode Values”

<table>
<thead>
<tr>
<th>K</th>
<th>V11</th>
<th>Which of the following best describes your experience working at Globex-Thermodynamics, Inc?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

After “Recode Values”

<table>
<thead>
<tr>
<th>K</th>
<th>V11</th>
<th>Which of the following best describes your experience working at Globex-Thermodynamics, Inc?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Steps for Recoding Values and Variable Naming

Follow the steps below to either **Recode Values** or use **Variable Naming**. Please note the following:

- This must be done on a question-by-question basis.
- To disable recoding or renaming, you must also do that on a question-by-question basis. It is not like *export tags* where you can easily turn it on or off.
- If you “Export as Values”, the *Recoded Values* will be in export.
- If you “Export as Labels”, the *Renamed Variables* will be in the export.

1. Click the **Edit Survey** tab.
2. Click a question.
3. Click its purple button.
4. Select “**R**e**c**ode **V**alues…”.

5. Check “**R**ecode **V**alues” or “**V**ariable **N**aming” or both depending upon what you wish to do.

6. If Recoding Values, type in a new number for each question.
7. If Variable Naming, type some text for each question.
8. Click “Close”.
9. If desired, do the same for more questions.
10. When you export, either select “Answers as Labels” if you wish to export your “Variable Names” or select “Answers as Values” if you wish to export your “Recoded Values”.

© Marshall School of Business - Wayne Wilmeth  Survey_Analysis_Using_Excel.docx  10/21/09  Page 11 of 47
Solution 1: Using Pivot Tables

Pivot tables are perhaps the fastest method of calculating results as long as you don’t need to see the actual rows of matching data.

1. Click the “Mult_CHOICE_Single_Answer” sheet.
3. Click the “Insert” tab and then click “Pivot Table”.
4. Drag the column header (What is your Major) into the “Row Labels” box and also into the “Values” box.
   This should produce the pivot table shown below.

5. If it is summing instead of counting, click the “values” drop down and select “Value Field Settings”.
6. Select “Count” from the list and click “OK”.

Also known as “Radio” buttons, when using this question type the user can only select one of the possible choices. When exported to Excel, multiple choice single answer questions appear in a single column. The image below shows data exported as “labels” but the techniques shown in these examples works for data exported as “values” as well. Some of the analysis techniques you can use include:

- PivotTables
- CountIF()
- AutoFilter in combination with the Subtotal() function. (Shown later)
- An array formula to determine the number of people selecting each response. (Shown later)
Solution 2: Using CountIF()
Excel’s Countif() function allows you to count the number of times a specific word or number appears in a range of cells.

Syntax: \[ \text{Countif(Range, "Criteria")} \]

This is the items you are counting. This can be text (in quotes), numbers, a cell address, or a Boolean equation i.e. “>=3” (in quotes). It cannot contain formulas or functions.

1. Click the “Mult_Choice_Single_Answer” sheet.

We have typed the three different possibilities in cells A17:A19 and will use these cell addresses as the criteria in the CountIF() function. This enables us to only have to type the formula once and then copy it.

2. Click in cell B17.
3. Type the following: \[ \text{=Countif(A$3:A$14,A17)} \]
   (The $ signs are to prevent the range A3:A14 from shifting down when we copy down.)
4. Copy the formula to B18 & B19.

This tells us that the word Finance exists 5 times, Accounting 4, and Marketing 3 in the range A3:A14.
MULTIPLE CHOICE WITH “ALLOW TEXT ENTRY”

When you couple a multiple choice question with “Allow Text Entry” so a user can write in their own choice, the question will export additional columns to Excel for what the user wrote in. This is true for single and multiple answer questions. In the example below, in row 8 and 11, users selected “Other” and typed in their own major. The text they typed in is stored in the column next to it.

1. Click the “Mult_Choice_Other” sheet.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Q1</td>
</tr>
<tr>
<td>2</td>
<td>What is your major?</td>
</tr>
<tr>
<td>3</td>
<td>Finance</td>
</tr>
<tr>
<td>4</td>
<td>Marketing</td>
</tr>
<tr>
<td>5</td>
<td>Accounting</td>
</tr>
<tr>
<td>6</td>
<td>Finance</td>
</tr>
<tr>
<td>7</td>
<td>Finance</td>
</tr>
<tr>
<td>8</td>
<td>Other</td>
</tr>
<tr>
<td>9</td>
<td>Finance</td>
</tr>
<tr>
<td>10</td>
<td>Accounting</td>
</tr>
<tr>
<td>11</td>
<td>Other</td>
</tr>
<tr>
<td>12</td>
<td>Marketing</td>
</tr>
<tr>
<td>13</td>
<td>Finance</td>
</tr>
<tr>
<td>14</td>
<td>Accounting</td>
</tr>
</tbody>
</table>

Possible Solutions

You can use both CountIF() and PivotTables as shown in the previous to display the number of responders who selected each choice: Finance, Marketing, Accounting, or Other. If you need to see what the actual write in responses for “Other” is, use “Filtering” which is covered a little bit later.
MULTIPLE CHOICE/MULTIPLE ANSWER – TOTAL COUNT PER COLUMN

Also known as “check” boxes, when using this question type the user can select one more than one of the possible choices. When exported to Excel, each possible response is in a separate column.

1. Click on the “Mult_Choice_Mult_Answer” sheet.

In the example, there are three possible responses so there are three columns for the question. If the responder selected a choice, their choice will be in the cell; otherwise, the cell will be blank. For example, the person in row 3 checked “Athletics” and “Arts/Entertainment” but did not select “Autos”.

We wish to know the total number of times each item was selected. Suggested Solutions:
- CountA()
- PivotTables

Solution 1: Counting a Column’s Total Responses - CountA()

Excel’s CountA() function will count the number of cells in a range which contain either text or numbers. It does not count blank cells but does count cells which contain a zero. It differs from Count() in that Count() will only count cells with numbers while CountA() will count cells with number or letters.

Syntax: =CountA(range)

1. Click the “Mult_Choice_Mult_Answer” sheet.
2. Click in cell A9 and type the following: =CountA(A3:A8)
3. Copy A9 to B9, and C9.

CountA() should return the number of non blank cells for each column giving you the number of people who checked Athletics (4), Arts/Entertainment (3) and Autos (3).
Solution 2: Counting a Column's Total Responses - PivotTables
You can also use PivotTables to count the number of items in columns by dragging each column heading into the Values area of the PivotTable.

1. Click the “Mult_Choice_Mult_Answer” sheet.
2. Highlight A2:C7
3. Click “PivotTable” located on the “Insert” tab.
4. Click “OK” to accept the default settings.

You should have the PivotTable shown to the right.
**MULTIPLE CHOICE/MULTIPLE ANSWER – COUNT THE TOTAL ITEMS SELECTED**

CountA() and PivotTables are useful when you want to know how many people selected a particular choice in a column but what if you were also interested in the number of different combinations selected? For example, how many selected just one? Just two? All three? The simplest approach is to use CountA() to count the number of choices for each row and then use CountIF() to count the frequency of each possibility (i.e. 0, 1, 2, or 3).

**Solution: Counting the Number of Choices Selected - CountA() & CountIF()**

In this section, we will cover how to count the number of people who selected no choices, just 1 choice, just 2 choices, and all three choices of a multiple choice question. We will take two steps: first, use CountA() to count the number of items in each row and then use CountIF() to count the number of 0’s, 1’s, 2’s, & 3’s.

1. Click the “Mult_Choice_Mult_Answer” sheet.
2. Click in cell D3.
3. Type the following formula: \(=\text{CountA(A3:C3)}\)
4. Copy the formula to the remaining rows in column D (D4:D7).

This tells us the number of cells filled for each row (0, 1, 2, or 3).

We will now use CountIF() to count the number of 0’s, 1’s, 2’s, and 3’s in column D.

**Syntax:** `CountIF(Range,"Criteria")` (See page 13 for an explanation of CountIF.)

5. Type a 0, 1, 2, and 3 in cells A11, A12, A13, and A14 as shown below. This is our criteria for CountIF().
6. Click in B11 and type: `=\text{CountIF(D$3:D$7,A11)}` (The $ signs are so the cell addresses don’t shift when we copy.)

The results in B11:B14 indicate the number of people who selected 0 choices, just 1, just 2, and just 3 choices.

![Image of spreadsheet with formulas applied]

Note we could have also used the Frequency() function.
MULTI CHOICE/ANSWER: COUNT & DISPLAY SPECIFIC COMBINATIONS - TABLES

What if you were interested in specific combinations? For example, “How many people selected Autos and Athletics but not Arts / Entertainment?” Or “How many people selected just Autos?” Further, we would also like to see the names of the people who made the selections. In this example, we will convert our database to a “Table” to get a count and use the “Filters” to display only matching criteria and make the count accurate.

Part 1: Convert the Range to a Table
When you convert a database range to a “Table”, you get several new abilities including filtering & automatic totals.

1. Click the “Multiple_Choice_With_Tables” sheet.
2. Highlight from A2:D16 (We want to make sure Excel uses the question text as our column headings.)
3. Click the “Insert” tab and then the “Table” button.
4. Click “OK” to accept the data range you highlighted for the table.

Excel will band your rows and display a Design tab if you are clicked within your table.

5. Click within your table and then click the “Design” tab and check “Total Row” to make

6. Click in the last row, you will get a drop down that you can select different functions you wish to apply to the column. Select “Count” in this example.
**Part 2: Filter the Table and Count**

“Filter” can be used with a table or database to hide all but the desired data on a column-by-column basis. In this example, we wish to see responses where the person selected *Athletics* and *Autos* but nothing else. This means that there is a blank in the “Arts/Entertainment” column but nowhere else.

7. Use the drop down arrows next to the column headings to create filtering combinations. For example to see just *Athletics* and *Autos*, do the following:

   a. Click the **“Athletics”** arrow and check just **“Athletics”**.
   b. Click the **“Arts/Entertainment”** arrow and check just **“Blanks”**.
   c. Click the **“Autos”** arrow and check just **“Autos”**.

Excel should now be displaying just those people who selected *Athletics* and *Autos* but not *Arts/Entertainment*. It should also be displaying the total count in the bottom row.

**Disadvantage of Tables**

The only problem with this method is that you have to change your criteria for each combination you wish to analyze. This means that you will not be able to more than one combination at the same time. See the next section on *Array Formulas* to display the results without having to change the criteria. Note that Array formulas will give you answers only, they will not display rows.
MULTI CHOICE/ANSWER: COUNT SPECIFIC COMBINATIONS – ARRAY FORMULAS

Using an array formula to count different answer combinations is useful when you don’t need to see any names associated with the results. Further, unlike the Tables method shown above, we don’t have to keep adjusting our criteria if we wish to see a particular combination. As with the previous example, we are interested in combinations of responses. For example, how many people selected just Athletics? Or Athletics and Autos but not Arts/Entertainment? The syntax of the array formula we will use to solve these questions is shown below.

Syntax: \(=\text{Sum}(\text{Condition1})*\text{Condition2})*\text{Condition3})*\text{Condition...})\)

The trick to an array formula is that you must press “CONTROL” + “SHIFT” + “ENTER” simultaneously after typing or editing it rather than pressing just enter alone. If you just press Enter as you would with a non array equation you will get an error or the wrong answer.

Array Example 1: Just Athletics
Using the spreadsheet above, we wish to count the number of people who selected Athletics but nothing else.

1. Click the “Mult_Choice_with_Arrays” sheet.
2. Click in a blank cell below your data and type the formula below but don’t press Enter.
   \(=\text{SUM}((B3:B16="Athletics")*(C3:C16<">"Arts/Entertainment")*(D3:D16<">"Autos"))\)
3. Press Control + Shift + Enter You should get 4 people selected just Athletics.

Array Example 2: Autos & Athletics but not Arts / Entertainment
Using the spreadsheet above, we wish to count the number of people who selected Autos and Athletics but not Arts / Entertainment.

1. Click in a blank cell below your data and type the formula below but don’t press Enter.
   \(=\text{SUM}((B3:B16="Athletics")*(C3:C16<">"Arts/Entertainment")*(D3:D16="Autos"))\)
2. Press Control + Shift + Enter You should get 3 because this combination exists 3 times.

Array Example 3: Selected All Three
We wish to count the number of people who selected Autos, Athletics, and Arts / entertainment.

1. Click in a blank cell below your data and type the formula below but don’t press Enter.
   \(=\text{SUM}((B3:B16="Athletics")*(C3:C16="Arts/Entertainment")*(D3:D16="Autos"))\)
2. Press Control + Shift + Enter You should get 1 because this combination exists only once.
How Does the Array Formula Work?

There are three concepts that you must know to understand how these array formulas work.

a. Pressing Control + Shift + Enter allows Excel to process numbers in a range individually rather than in aggregate. For example, it first runs B3, C3, & D3 through the equation, then B4, C4, & D4 and so on. Once it has exhausted all of the cells in the range, it works its way out and the Sum( ) function kicks in.

b. When you give Excel a condition to evaluate such as: B3="Athletics", it will return either True or False depending upon whether or not cell B3 actually contains the text Athletics. To a computer, True=1 and False=0.

c. Zero times any number is zero.

Let's see how Excel processes this equation.

=SUM((B3:A16="Athletics")*(C3:C16<>"Arts / Entertainment")*(D3:D16<>"Autos"))

First, it substitutes in the contents of B3, C3, & D3 into the equation:

=SUM((Athletics="Athletics")*(Arts / Entertainment<>"Arts / Entertainment")*(Autos<>"Autos"))

Next, it evaluates each condition as either true or false and uses 1 for true and 0 for false:

=SUM((1)*(0)*(0)) evaluates to 0 because 1*0*0 is equal to zero.

It does this for each row, substituting in the values, and then returning either 1 or 0 depending if the condition is True or False. The only time it will return 1 is for row 5 because all conditions are True:

=SUM((Athletics="Athletics")*(Arts / Entertainment<>"Arts / Entertainment")*(Autos<>"Autos"))

=SUM((1)*(1)*(1)) evaluates to 1.

Once each row has been evaluated, the Sum() function is activated. It now contains a series of 0's and 1's as shown:

=SUM(0,0,0,0,1,0,0)

When Sum() adds up all of its 1's and 0's, it returns 1.

Conceptually this may seem more complicated than other methods but the structure is really very simple to create. What's nice about it is that if you have more conditions, you simply place them inside of the Sum() equation.
**IsBlank() & IsText() Variation on an Array Formula**

“Athletics” and “Autos” are pretty short and are not a lot of trouble to type into our array formula but if we had longer criteria to evaluate, the door opens a little wider for typos which would give us the wrong answer. Instead, try using IsBlank( ) and IsText( ) in your conditions.

- **IsBlank(range)**: This function looks to see if a cell is blank or not. If it is blank, it returns *True* (1). If it isn’t blank, it returns *False* (0).
- **IsText(range)**: This function looks to see if a cell contains text. If it does contain text, it returns *True* (1). If it doesn’t contain text, it returns *False* (0). Note that a number is not considered *text*.
- **IsNumber(range)**: Though not applicable to this example, this function looks to see if a cell contains a number. If it does contain a number, it returns *True* (1). If it doesn’t contain a number, it returns *False* (0). It would be useful if you had exported your answers as values.

Here are the three examples from the previous page again only this time we are using IsBlank() and IsText(). Basically, substitute IsText() for text matches and IsNull( ) for blanks.

Again, make sure you press **Control + Shift + Enter** after typing or editing array formulas.

- **Example1 (Athletics Only):**
  
  \[
  \text{Example 1: } = \text{SUM}((\text{IsText(B3:B16)}) \times (\text{IsBlank(C3:C16)}) \times (\text{IsBlank(D3:D16)}))
  \]

- **Example 2 (All three):**
  
  \[
  \text{Example 2: } = \text{SUM}((\text{IsText(B3:B16)}) \times (\text{IsBlank(C3:C16)}) \times (\text{IsText(D3:D16)}))
  \]

- **Example 3 (Athletics or Autos):**
  
  \[
  \text{Example 3: } = \text{SUM}((\text{IsText(B3:B16)}) \times (\text{IsBlank(C3:C16)}) \times (\text{IsText(D3:D16)}))
  \]

**Another Variation**

As another variation on our array formula, you can also type the three possible choices in cells and then use those cell addresses in the formula. To set criteria, simply delete one or more of the items to create blanks.

![Excel Table](Chart.png)
MATRIX QUESTIONS

This question type allows you to specify a rating for each row item. For example, for Instructor you can select from Very Bad to Very Good and the same is true for Content and Facilities.

When single answer matrix questions are exported to Excel, each row statement from the survey is placed in its own column. In our question we asked the user to rate three items (Instructor, Content, and Facilities) so we got three columns in Excel. To identify each column, Qualtrics places the statement after the question (i.e. “Please rate each item. – Instructor”, “Please rate each item. – Content”, “Please rate each item. – Facilities”)

A single row pertains to a single response. For example, Tom thought the Instructor was “Very Good”, the Content was “Good”, and the Facilities were “Neither Good nor bad”.

![Matrix Questions](image)

Answers as Values

When analyzing matrix questions, people are usually interested in averages, standard deviations, etc, therefore, you may find your analysis easier if you export your answers as values. In this example, Very Good becomes 1, Good becomes 2, etc.

Recode Values

If you wanted to reverse the scale (i.e. 5 becomes Very Good, 1 is Very bad, etc.), or provide a different scale such as 1-10, your easiest option is to use the “Recode Values” options in Qualtrics prior to exporting. This is shown on page 10.

![Recode Values](image)
Because analysis on matrix questions typically includes averages, standard deviations, etc, I strongly suggest that you export your answers as Values. To perform your analysis, you can use most of the tools covered in previous examples including:
- Pivot Tables
- Arrays
- Array Formulas
- CountIF(), CountA(), Frequency()

Because statistical analysis is most often used with Matrix questions, in this section we will introduce Average(), AverageIF(). We will also show an array method to get the average and PivotTables.

**Example 1: Finding the Overall Average – Average()**
If you want to know the overall average rating for a class, use Excel's Average() function. This one is simple if you exported as values.

Syntax: \[=\text{Average(Range)}\]

1. Click the “Matrix As Values” sheet.
2. Click in a blank cell (C19 for example).
3. Type the following and press enter: \[=\text{Average(B3:D16)}\]
   You should get 2.44 as the average.

   ![Excel spreadsheet example](image)

   Note that the Average() function will ignore blank cells but if a cell contains a zero, it will include the 0 in the calculations to get the average.

**Example 2: Average for Just Instructor**
If you wanted the average for a particular column only, (Instructor, Content, or Facilities), you would simply limit your range to just one of those columns.

For example to get the Instructor's average, the formula would be: \[=\text{Average(B3:B16)}\]
Example 3: Find the Instructor Average Based on a Criteria – AverageIF()

Like Average(), AverageIF() will the average of a set of numbers but only if they match a given criteria. In this example, we wish to find the average rating the Instructor received but only from “Grad” students.

=AverageIF(Criteria Range,"Criteria",Range of Cell to Average)

- This is a cell or range of cells which contains labels or values that the criteria will evaluate.
- This is a cell address, label, value, or Boolean equation which does the evaluation.
- These are the cells to average assuming they meet the criteria. If Criteria Range is omitted, this area is used as the Criteria Range.

Grad Average
1. Click the “Matrix_AverageIF” sheet.
2. Click in any blank cell (C19 for example) and type:

   =AverageIF(A3:A16,"=Grad",B3:B16)

3. Press enter. You should get 2.11

Undergrad Average
4. To get the Instructor average for Undergrads, click in cell C20 and type:

   =AverageIF(A3:A16,"=Undergrad",B3:B16)

5. Press enter. You should get 2.75

Note that AverageIF() cannot find the average of more than one column. For example, you can’t use it to get the average for Instructor, Content, and Facilities. See the Average Using an Array formula for that.
Example 4: Find the Overall Average Based on a Criteria – Average AverageIF()s

In this example, we wish to find the overall average from Grad students for all three columns combined (i.e. Instructor, Content, and Facilities). Unfortunately, we can’t use AverageIF() for this because AverageIF() cannot evaluate multiple columns of data; however, you can use =AverageIF() to find the average of each of the three columns individually and then use Average() to average the AverageIF()s together.

The basic structure would be: \( \text{=Average(AverageIF(),AverageIF(),AverageIF())} \)

1. Click the “Matrix_AverageIF” sheet.
2. Click in a blank cell (C21 for example) and type:


3. Press enter. You should get 2.3
Example 5: Find the Overall Average Based on a Criteria – Array Formula

In the previous example, we found the overall average of just Grad students by nesting an AverageIf() for each column inside of the Average() function. This works fine with just a few columns but if you have many, the nesting can get fairly lengthy. As an alternative, this example solves the same problem using an array formula. (It will also impress the cool kids.)

1. Click on the “Matrix_Array_Average” sheet.
   As you can see, there are a few more columns that we wish to include to find the average score by just Grad students.

2. Click in a blank cell (C18 for example and type the formula below.
3. Be sure to press CONTROL + SHIFT + ENTER after you are done typing. You should get 2.16

\[
\text{Average Grad Responses: } \frac{\text{SUM}((\text{A3:A16}=\text{"Grad"}) \times (\text{B3:F16}))}{\text{SUM}((\text{A3:A16}=\text{"Grad"}) \times \text{ISNUMBER}(\text{B3:F16}))}
\]

**Sum All Grad Values**
This section adds all of the values for Grad students only together.
The purple code checks to see if the current cell in column A contains the word “Grad” and returns a 1 if it does and a 0 if it does not. The resulting 1’s and 0’s are multiplied by the corresponding cell in the green range (B3:F16). Because 1 times a value is the value and 0 times a value is 0, you wind up with a bunch of 0’s and values. Sum() then adds all of the 0’s and values up to get a total.

**Count of Grad Responses**
This section counts the number of number of responses by grad students.
The purple code checks to see if the current cell in column A contains the word “Grad” and returns a 1 if it does and a 0 if it does not. IsNumber() checks to see if each corresponding cell in the range contains a number. If the cell does contains a number IsNumber() returns 1; If it does not, it returns 0. The corresponding results from our comparison and IsNumber() are multiplied together so you get a bunch of 1’s for cells which contain numbers and 0’s for cells which are blank. Sum() then adds all of the 1’s and 0’s together to get a total count of the Grad cells which contain values.

**Sum of Grad Values / Count of Grad Values**
Finally, we divide the sum of all grad values by the number of grad responses to get an average.
Example 6: Find a Column Average Based on Multiple Conditions - AverageIFS()

If you need to find the average of a single column of cells based on multiple conditions, you can use the AverageIFS() function. Note that the numbers you are averaging cannot be a block – it must be a single column.

=AverageIFS(Range to Average, Criteria Range 1, Criteria 1, Criteria Range 2, Criteria 2, ...)

This is the range of cells whose average you wish to find.
This is the range of cells whose data will be considered in the criteria evaluation.
This is the criteria evaluation. It uses the cells in the Criteria Range.
These are optional additional criteria. They are comprised of a Criteria Range and a Criteria.

In this example, we wish to determine the average salary of Males who are age 50 or over.

1. Click the “AverageIFS” sheet.
2. Click in cell D17 and type the function below and press enter.

=AverageIFS(C3:C14,A3:A14,">=50",B3:B14,"=Male")

You should get 42,500.

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<tr>
<td>14</td>
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<td>Female</td>
<td>65,000</td>
<td></td>
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</tr>
</tbody>
</table>

18 Average Salary of Females >=50  68,333
COUNT RESPONSES MATCHING MULTIPLE CRITERIA - COUNTIFS()

You can use COUNTIFS() to count the number of responses which match multiple conditions. For example, how many of our respondents where Males greater or equal to age 50?

\[ \text{COUNTIFS(Range to Count, Criteria 1, Criteria 2, Criteria 3, ...)} \]

- This is the range of cells you wish to count
- This is the criteria evaluation. It evaluates the cells in the Range to Count.
- These are optional additional criteria evaluations.

1. Click the “AverageIFS_Salary” sheet.
2. Click in a blank cell (D19 for example).
3. Type the function below and press enter. You should get 2.

\[ \text{=COUNTIFS(A3:A14,">=50",B3:B14,"=Male")} \]
COUNT OF ITEMS GREATER THAN AVERAGE

In these examples, we wish to count the number of items which are greater than the average or less than the average. There are several methods we could use for this:

- Tables using the “Above Average” filter.
- Using a combination of an IF(), Average(), and Sum().
- An Array Function.
- PivotTables by finding the average and then filtering by a hard coded average.
- Advanced Filter and DCount()

Solution 1: Count Salaries Greater than the Average Salary - Tables

This is probably the easiest solution. Not only does it count for you but it also allows you to use criteria if desired and see the matching records. Its only drawback is that if you wish to change your criteria to find a different solution, your previous solution is no longer valid.

1. Click the “Over_Average” sheet.
3. Click the “Table” button located on the “Insert” tab.
4. Click “OK” to accept the range A3:D14 and make sure “My table has Headers” is checked.
5. Click inside of your table to make the “Design” tab appear.
7. Click the filter for the “Salary” column.
8. Select “Number Filters” and then “Above Average”.

9. Set the “Total” row to “Count”. 
Solution 2: Count Salaries Greater than the Average Salary – IF(), Average(), & Sum()

Conceptually, this is a fairly simple solution: We will use IF() to place a 1 next to any salary that is greater or equal to the average and then use sum() to add up all the 1s to get a count of all the number of salaries greater than average. We will also use the Average() function to determine the average. It will be nested within our IF() statement. Its advantage is that we don’t have to filter our database. Its disadvantage is that it will not hide records which don’t match our criteria.

=IF(Condition,True,False)

*Condition determines whether the code in the True of False section will be executed. Condition must contain an equation or function that returns either true or false.*

*Both True and False can contain a value, text in quotes, a cell address, or a formula/function.*

1. Click the sheet: “Over_Average_If”.
2. Click in cell D3.
3. Type: =if(C3>=Average(C$3:C$14),1,0)
   (You should get 1s next to any number which is greater or equal to the average.)
5. Click in cell D16.
6. Type: =Sum(D3:D14)
   (This sums all of the 1’s giving you the number of salaries greater or equal to the average.)
About Solution 2: Nesting The And() Function Within An If() Function

In the previous example, we nested an AND() function within an IF() function. This section explains the concept.

About IF() statements
The IF() function returns one of two possibilities depending upon whether or not a condition is true or false.

Syntax:    =IF(Condition,True,False)
Example:   =IF(A2>=10,"10 or more","Under 10")  Would return “10 or More” because the condition is true.
            (20>=10 is true so the “True” section is activated.)

About AND() function
This function returns either “True” or “False” and is often inserted into the Condition section of an IF() statement.

Syntax:    =AND(Condition1,Condition2,Condition3,Condition4,...)
Example:   =AND(C2>=A2,C2>=B2,C2>=D2)

If all of these conditions are true, AND() will return “True”. If any one of them is false, it will return “False”.

Solving our Example
In the example on the previous page, we nested the AND() function in the condition section of our IF() function. When True, IF() will return 1; when False, IF() will return 0. We will then add up all of the 0’s and 1’s to see how many people gave their highest percentage to Mortgage/Rent.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Over Average</td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td>Gender</td>
<td>Salary</td>
<td>=IF(C3&gt;=AVERAGE(C$3:C$14),1,0)</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>Male</td>
<td>35000</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>Female</td>
<td>75000</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>60</td>
<td>Male</td>
<td>80000</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>Female</td>
<td>60000</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>42</td>
<td>Male</td>
<td>61000</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>36</td>
<td>Female</td>
<td>90000</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>25</td>
<td>Male</td>
<td>42000</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>Male</td>
<td>36000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>39</td>
<td>Female</td>
<td>55000</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>41</td>
<td>Female</td>
<td>40000</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>52</td>
<td>Female</td>
<td>92000</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>65000</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Total Count:</td>
<td></td>
<td></td>
<td>=SUM(D3:D14)</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Solution 3: Count Salaries Greater than the Average Salary – Array Formula**

In this example we will use an array formula to count the number of salaries greater or equal to the average. Its advantage is that it is the least intrusive because it all takes place in one cell and does not require filtering the database. It also allows multiple criteria. Its disadvantage is that array formulas can be conceptually difficult and that it does not show matching records.

1. Click the sheet: “Over_Average_Array”.
2. Click in cell F2.
3. Type the array formula below and press Control + Shift + Enter.

   ![Array formula example](image)

   You should get 6.

If you would like to count just the female respondents whose salary is greater than the average, type the equation below and press Control + Shift + Enter.

```excel
=SUM((C3:C14>=AVERAGE(C3:C14))*(B3:B14="Female"))
```

Note that this last example did not find just the average of female salaries, it was the average of all female and male salaries. If you wanted the average of just female salaries and then the number of salaries greater or equal to that average, you could use the following array formula:

```excel
=SUM((C3:C14>=AVERAGEIF(B3:B14,"Female",C3:C14))*1)
```

Or

```excel
=SUM((C3:C14>=SUM((B3:B14="Female")*(C3:C14)))/SUM((B3:B14="Female")*1))*1)
```

Remember, you must press Control + Shift + Enter after typing or editing an array formula.
FIND THE MOST FREQUENTLY OCCURRING VALUE – MODE()

You can use Excel’s Mode() function to find the most frequently occurring number. It is useful for any question type which returns values.

1. Click the “Mode_&_Stdev” sheet.
2. Click in cell C19.
3. Type the following: =MODE(B3:D16)
4. Press Enter. You should get 2.

FINDING THE LARGEST OR SMALLEST VALUE IN A RANGE: MAX() & MIN()

Excel’s Max() function will return the largest value in a range and the Min() function will return the smallest.

Finding the Largest Value: Max()
1. Click the “Mode_&_Stdev” sheet.
2. Click in Cell C21.
3. Type: =Max(B3:B16) and press enter. Excel should return 4.

Finding the Smallest Value: Min()
1. Click the “Mode_&_Stdev” sheet.
2. Click in Cell C22.
3. Type: =Min(B3:B16) and press enter. Excel should return 1.
Matrix Analysis - Standard Deviation

Standard deviation tells you how similar your responses were. Was everyone’s response to the survey mostly the same or did they have widely varying responses where one person gave all 1’s and another person gave all 5’s?

Syntax: =Stdev(Range)

1. Click the “Mode&_Stdev” sheet.
2. Click in a blank cell (D20 for example).
3. Type: =Stdev(B3:D16) and press enter.

You should get about 1.12 when means that assuming a standard bell curve, 68% of the response were within 1.12 of the average or if you do the math, between 1.32 and 3.56. (i.e. 2.44-1.12=1.32 and 2.44+1.12=3.56). See the section below for an explanation of Standard Deviations and the Normal Curve.

Interpreting Standard Deviation

Standard Deviation is a somewhat abstract concept used to determine how disperse your data is from the average (mean). A low standard deviation indicates that most of the values are similar while a high standard deviation indicates that they vary more widely. Results for surveys typically follow a bell curve (normal distribution) where most of the data is close to the average with fewer responses further away from the average. The image shows this graphically.

The concept of Standard Deviation slices up the normal curve into deviation groups. In the normal curve, most of the responses are within 34% of the mean (either higher or lower) creating a group of 68% of the respondents (34+34=68). The 34 percent to each side of the mean is known as 1 standard deviation. The next group is further away from the mean and is comprised of about 13.5% of the respondents on either side of the mean. This is known as 2 standard deviations. Finally, about 2.1% of the responses are the furthest away from the mean and is known as 3 standard deviations.

Going back to our example above, we got a standard deviation of 1.12 which means that 68% (1 standard deviation) of the responses where within 1.12 points of the average.

It also means that most of our responses (95% or 2 standard deviations) were within were within 2.24 points of the mean (1.12 * 2).
CREATING & EXPORTING A CONSTANT SUM QUESTION IN QUALTRICS

This allows you to either type in numbers in boxes or drag bars to rate each item on a given scale. Typically, the numbers should add up to 100 but the maximum is adjustable.

When exported to Excel, each row item gets its own column. Be sure to export these as “Values” or your answers for this question type will be meaningless. Also, see the previous page for a method to narrow your question text for the export.

Specifying the Maximum Total
If you would like to specify a number that the sum of the bars or boxes must sum to, follow the steps below.

1. Click the question to be affected.
2. Click its purple box and then select “More Advanced Options”.
3. Click the “Options” tab.
4. Type the number you wish the boxes or bars to sum to in the “Choices must total” box.
5. Click “Save Question”.

Where does your money go?
(Total should equal 100)

<table>
<thead>
<tr>
<th>Food</th>
<th>Gasoline</th>
<th>Mortgage/Rent</th>
<th>Utilities</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>20</td>
<td>30</td>
<td>10</td>
<td>60</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>60</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>90</td>
<td>100</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Type
○ Choices
○ Bars

Where does your money go?

Utilities
Gasoline
Mortgage/Rent
Total

0
0
0
0

Options
Advanced

Validation

No validation

Choices must total: 100

Gender
Male
Female

Where does your money go? - Mortgage/Rent

Where does your money go? - Food

Where does your money go? - Utilities

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>1</td>
<td>Gender</td>
<td>Where does your money go? - Mortgage/Rent</td>
<td>Where does your money go? - Food</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>Male</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>Male</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>Female</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Female</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Female</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>Female</td>
<td>65</td>
<td>25</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q1: Which Item has the Highest Percent?
The simplest method is to sum each column.
1. Click the “Constant_Sum” sheet.
2. Click in cell B12 and type:
   \[ =\text{Sum}(B2:B11) \]
3. Copy the formula to the right.
The column with the largest number is the one with the highest percent.

![Excel screenshot showing the sum formula applied to column B]

Q2: How many times was Rent/Mortgage more than 50% of the total income?
1. Click the “Constant_Sum” sheet.
2. Click in cell B15.
3. Type this equation: \( =\text{COUNTIF}(B3:B11, ">=50") \)

Q3: How many times was Rent/Mortgage the Maximum Value? - AND() & IF()
We will place a 1 to the right of any row where Mortgage/Rent is the largest value in the row by nesting the AND() function within an IF() function and then we will sum up all of the 1s.
1. Click the “Constant_Sum” sheet.
2. Click in cell E3 and type:
   \[ =\text{IF}(\text{AND}(B3>C3, B3>D3), 1, 0) \]
3. Click in cell E12 and type: \[ =\text{Sum}(E3:E11) \]

Q3a: How many times was Rent/Mortgage the Maximum Value? - Array Formula
\[ =\text{SUM}((C2:C5>=A2:A5)*(C2:C5>=B2:B5)*(C2:C5>=D2:D5)) \]
(Remember to press Control + Shift + Enter)
RANK ORDER

This question type allows you to rank items by using your mouse to drag the choices up and down. When exporting to Excel, each row item gets its own column.

Please tell us your favorite dessert items by dragging the text up or down.

<table>
<thead>
<tr>
<th>Ice Cream</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chocolate Cake</td>
<td>2</td>
</tr>
<tr>
<td>Fruit Salad</td>
<td>3</td>
</tr>
<tr>
<td>Pecan Pie</td>
<td>4</td>
</tr>
</tbody>
</table>

1. Click the “Rank_Order” sheet.

Rank Order questions export to excel with each choice in its own column and the rank each person gave the choice below it. For example, the first person in this example (row 2) rated Ice Cream #4, Chocolate Cake #2, Fruit Salad #3, and Pecan Pie as their #1 choice. The remaining responses are in the rows below.

Top Two Items - Sum() and Average()

There are several different methods you could use to analyze your results. For example, if you just wanted to select the top two choices, you might want to use Average() or Sum() and then take the two lowest values as the winners.

1. Click in cell B9 and type: =Sum(B2:B7)
2. Click in cell B10 and type: =Average(B2:B7)
3. Copy B9 & B10 to the other cells in their rows.

Ice Cream has the lowest sum (12) and average (2) followed up by Pecan Pie (13) and (2.2).
Rank Order Analysis – Frequency()

If you wanted to know how many people rated each dessert as their #1 choice, #2, #3, and #4, the Frequency() function is ideal for that. Note that this is an “Array” function which means that we can get multiple results at once by highlighting multiple cells prior to typing our formula and that you must press Control + Shift + Enter.

**Frequency(Data Array, Bins Array)**

This is the column of data you are analyzing; for example, all of the values in the *Ice Cream* column.

This is a range of cells you must create which contains the values you wish Excel to group by. For example, we wish to know how many 1s, 2s, 3s, and 4s are in each column so we would make a range containing 1, 2, 3, & 4.

1. Create your *Bins Array* by typing a 1 in A13, a 2 in A14, a 3 in A15, and a 4 in A16.


3. Type the following:

   =Frequency(B2:B7,$A13:$A16)

4. Press Control + Shift + Enter

   This should have filled in B13:B16.

5. Highlight B13:B16 and copy the array to apply it to the other columns as shown below.

For each column, the results tell you how many people rated an item as their first, second, third and fourth choice. For example, in the *Ice Cream* column, 4 people picked it as their #1 choice, 0 people as their #2, 0 people as their #3, and 3 people as their #4 choice.
**Rank Order Analysis – PivotTables**  
This gives you the same results as using some only it does it with a PivotTable. The structure you would use is shown below.

2. Click the “Insert” tab and then “PivotTable”.
3. Click “OK” and then structure the PivotTable as shown below.
COLLECTING DATES

There are a couple of options you can use when you need to collect date information from your responders: *Open Ended Questions* and *Side-by-Side Questions*. Both allow you to collect hire dates, expiration dates, birthdates, etc.; however, if you are working with international responders who may be used to a different date format, you should go with the *side-by-side* model to insure accuracy.

**Open Ended Question**
This is the easiest to create and analyze in Excel but does not prevent users from switching the month and day.

**Side-by-Side Question**
This is more time consuming to create and analyze in Excel but it does make it more clear to the user where to put the day and where to put the year.

**Collecting Dates Using an Open Ended Text Question**
When using this method, your user will type the date into a text box as so: 2/25/2008. You can use validation to ensure that the date is typed in this format: mm/dd/yyyy. This method is useful when you know all of your responders are used to typing dates in the mm/dd/yyyy format but can give you bad data if your responder is from a country which uses the dd/mm/yyyy format. Even with validation a user could type February 8th, 2008 like this: 02/08/2008 or like this: 08/02/2008 and you could end up with inaccurate information.

The validation area (shown to the left) is accessed by clicking the purple drop down and selecting “More Advanced Options”.

The question exports to Excel as shown below.
Collecting Dates Using a Side-by-Side Question
When it comes to accuracy, this is the more reliable method of collecting dates because it gets around the mm/dd/yyyy or dd/mm/yyyy issue by using drop downs; however, creating the question and analyzing the data is more time consuming.

Steps for Creating a Side-By-Side Question to Collect Date Data
1. While on the “Edit Survey” tab, click the “Create a New Question” button.
2. Click the green “Change Question Type” button and then click “Side By Side”.
   You will get a question similar to the one shown below. We need to have just one row (Statement 1) and three columns (Heading 1, Heading 2, and Heading 3)
3. Click the “Click here to edit question” link. All work must be done in this area.
4. Click on the “Question” tab and type the question’s text.
5. Click the “Choices” tab
6. Click the “Go to Advanced Mode” button.
7. Type the question text for statement 1.
8. Check statements 2 & 3 then click the “Delete” button.
8. Click the “Side-By-Side Questions” tab.
9. If necessary, click the “Add” or “Delete” button at the bottom of the screen to get a total of three questions.
10. Make the settings indicated below in steps a-f.
11. Complete steps a-g below then click the “Save Question” button located at the bottom of the screen.

Note on Acceptable Month Choices for Excel
While you can successfully export the month names to Excel using any type of spelling you desire, if you wish to recombine them into a single usable field that you can manipulate later within Excel, you should use one of the conventions listed below.

**Full Month Names**
If you want the full names of the months on the drop downs, use the spelling below on your list:

January, February, March, April, May, June, July, August, September, October, November, December

**Month Abbreviations**
If you want abbreviated month names on the drop downs, use the abbreviations below on your list:

Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec

**Month Numbers**
If you want to use month numbers on the drop downs, use the following: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
**Exported as Labels to Excel**

When exported as *labels* to Excel, the three parts (Month, Day, Year) will appear in separate columns as shown below. Note that exporting as *values* would convert the months from Jan-Dec to 1-12 but it would also convert the years (i.e. 2008 becomes 1, 2007 becomes 2, etc. so be sure to export as *labels*.

![Excel Sheets](image)

**Combining the Separate Date Parts into a Single Cell**

If you wish to join the date information (month, day and year) into a single cell in typical Excel data format, there are two steps involved:

1. Use the concatenation character “&” to join the date in an acceptable Excel date format.
2. Paste as values to convert the formula to a value.

**Step 1: Combining the Date Parts Using “&”**

You can use the ampersand to make items in separate cells appear next to each other in a single cell. If you wish to add extra characters such as dashes or slashes, they must be in quotes. Note that if we wish to use Excel to manipulate the combined date later, then we must combine them using one of Excel’s existing date formats. Because we used abbreviations, this is the only date format available: *14-Mar-2001* (i.e. *day-mon-year*)

1. Click the sheet: “Combining_Date_Parts”.
2. Click in cell and type: `=A3"/"&B3"/"&C3`

Once copied, the dates would appear as shown.
**Step 2: Converting the Combined Dates from a Formula into Values**

Although the date parts now appear in a single cell, it is really a formula. If you would like to convert it to an actual data value rather than a formula, follow the steps below. Converting it to an actual date value rather than a formula will allow you to perform more operations on the cell such as changing the date format.

1. Highlight the formulas you typed in “Step 1”.
2. **Right** click the highlighted area and select “Copy”.
3. Click a destination cell for the copied block.

   **Excel 2007 Users**
   
   a. Click the “Home” tab.
   b. Click the “Paste” drop down arrow.
   c. Click “Paste Values”.

   **Excel 97-2003 Users**
   
   a. Click “Edit” from the menu.
   b. Click “Paste Special”.
   c. Select “Values” & click “OK”.

The contents of the cells you copied to will look the same as the data in the cells you copied from; however, you if you click one of the cells you copied to and look on the editing bar, there are no formulas, just the value.
CONVERT LABELS TO VALUES: FIND & REPLACE

Most survey questions which involve ranking are exported as values to make mathematical manipulation and analysis easier. However, if for some reason you are only able to export as labels or perhaps someone provided you a spreadsheet where there responses were exported as labels, you can use Excel’s “Find and Replace” feature to convert your labels to values.

1. Click the sheet: “Find&Replace_Labels”.
2. To limit the area where Find & Replace take place, highlight B3:D16.

In this spreadsheet, we wish to convert our labels to values as follows:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Bad</td>
<td>1</td>
</tr>
<tr>
<td>Bad</td>
<td>2</td>
</tr>
<tr>
<td>Neither Good nor Bad</td>
<td>3</td>
</tr>
<tr>
<td>Good</td>
<td>4</td>
</tr>
<tr>
<td>Very Good</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Click the “Home” tab.
4. Click the “Find & Select” button and then click “Replace”.

5. Click the “Options” button.
6. Check “Match entire cell contents”.
   (If you don’t check this, when you replace “Very Good” with a 5, you will replace “Good” with a 5 as well.)

7. In the “Find What” box, type: Very Good
8. In the “Replace With” box, type: 5
9. Click the “Replace All” button and then click “OK” at the message box.
10. You would now repeat steps 7-9 four more times except in the Find What and Replace With boxes, you will be using:
    - Good & 4
    - Neither Bad nor Good & 3
    - Bad & 2
    - Very Bad & 1
HOW OPEN ENDED TEXT EXPORTS

This question type allows the user to type text into a box containing single or multiple lines.

When exported to Excel, one column will be used to store all of the responses. In the example shown, three different people have taken the survey.

Note that the maximum number of characters in a cell for Excel 2007 is 32,757.

HOW MULTIPLE CHOICE DROP DOWN LISTS EXPORT

This question type allows the user to select a choice from a list. The question and results will export to Excel in a single column.