Formulas & Functions in Microsoft Excel

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Preface

All of the lecture notes and supplementary sample data files are located at `http://biostat.mc.vanderbilt.edu/TheresaScott` under *Current Teaching Material*.

If you have any questions, feel free to contact me at theresa.scott@vanderbilt.edu or (615) 343-1713, or drop by my office D-2217 MCN.

References for this lecture

The following references were used to compile this lecture:

- The Excel 2003 Module information available from Carnegie Mellon University's Computer Skills Workshop Class (`www.cmu.edu/computing/csw`).
- The BayCon Group Microsoft Excel Online Tutorial (`www.baycongroup.com/el0.htm`).
- The Florida Gulf Coast University Excel 2000 Tutorial (`www.fgcu.edu/support/office2000/excel`).

Section 1

Introduction

The distinguishing feature of a spreadsheet program such as Excel is that it allows you to create mathematical *formulas* and execute *functions*. Otherwise, it is not much more than a large table displaying text.

- Recall, your spreadsheet environment will become a *dynamic* and *responsive* work environment when you use formulas and functions; they automatically updating when you change your data.

The following should be considered when creating a spreadsheet:

- Which terms are data/numbers that you will type.
- What terms are data/numbers that you will calculate from the data.
- Which numbers are constant and are to be used in a variety of calculations.
- What arrangement of the columns and rows will make it easiest for you and your intended audience to work with the spreadsheet.
  - Feel free to check out an additional lecture called "*Guidelines to Data Collection and Data Entry*" that can also be found on my website.
  - You can also find examples of a '*Spreadsheet from Heaven*' and a '*Spreadsheet from Hell*'.

1.1 Using Excel for Analysis

Excel is a great tool to use for data collection and entry, and even to use for some derivation of other columns. However, Excel ***IS NOT*** the best tool to use to conduct advanced analyses, especially statistical analyses.

Missing values can be very dangerous in Excel.

- In formulas and functions, missing values (i.e. blank cells) are sometimes taken as zeros, when they should represent data that are truly missing.
- Recommend consulting with an experienced statistician when wanting to conduct advanced and/or statistical analysis, or use packages like SPSS, STATA, R, or SAS.
- *Tip*: Be aware of Excel's *faults* and, if possible, set up a simple example to test the function's handling of blank cells.

Section 2

Formulas and Functions

As mentioned, the ability to perform calculations is one of the purposes of using a spreadsheet application. Some examples of the types of calculations that can be done are:

- totals
- subtotals
- average
- standard deviation

In Excel,the calculation can be specified using either a *formula* or a *function*.

- **Formulas** are *self-defined* instructions for performing calculations.
- In contrast, **functions** are *pre-defined* formulas that come with Excel.

In either case, all formulas and functions are entered in a cell and must begin with an equal sign '='.

2.1 Entering Formulas

After the equal sign, a formula includes the addresses of the cells whose values will be manipulated with appropriate *operands* placed in between. The operands are the *standard arithmetic operators*:

Operator	Meaning	Example
+	Addition	=A7+A9
-	Subtraction	=A7-A9
*	Multiplication	=A7*A9
/	Division	=A7/A9
^	Exponents	=A7^A9

→ *Practice Exercise:* Enter the following information into a blank worksheet (ignore any formatting) in columns A, B, and C, and in rows 1 through 6. Then calculate the Total Cost for the the Fall semester using a *formula* to add up the individual Costs (Tuition, Housing, etc.).

Costs	Fall	Spring
Tuition	10000	10000
Housing	5000	5000
Books	1000	700
Spending	1500	1000
Total Cost		