3. EXCEL FORMULAS & TABLES

Cell References

- **Absolute reference** - refer to cells by their fixed position.
  
  e.g. =$A$2+1

- **Relative reference** - refer to cell references in formulas in relation to the cell that contains the formula ("the cell two rows above this cell").
  
  e.g. =A2+1

- **Combination** - either the row is absolute and the column is relative or the row is relative and the column is absolute. e.g. =$A2+1 or =A$2+1
Example

- Excel adjusts cell references during the fill based on the reference type.

Combination Cell References

- How do $A1$ and $A$1 differ from $A$1?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>8</td>
<td>=A1/$A$3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>4</td>
<td>=A$1*$B4+B2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>=A1+A2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- What formula would result in cell D1 if you copy the formula from cell C1 to D1?

- What formula would result in cell E5 if you copy the formula from C2 to E5?
Named Cell Reference

- What kind of cell reference is a named cell?

![Image of Name Manager dialog box]

Problem 3.1

- An interesting Web site is www.worldometers.info

- Using the population of the world today and the present growth rate of 1.13% per year, design a worksheet that shows the population for each of the next 25 years.

- Let’s design and then implement
  - Make sure that the population is stored as a number and that you show the 1000 separator (,)
  - Make sure that percentages are displayed as percentages
Problem 3.1 Continued

- What is the predicted world population in 2041 if the growth rate is 1.13%?

- What is the predicted world population if the growth rate is 1%?

What-If Analysis & Goal Seeking

- Using Excel to scrutinize the impact of changing values in cells that are referenced by a formula in another cell is called what-if analysis.
Goal Seek

- Located under Data->What-If Analysis->Goal Seek

- Goal seek allows you to see how one data item in a formula impacts another.

- Goal seek can be used to answer the question:
  - What growth rate will lead to the population reaching 10 Billion in 2041?
Problem 3.2

- The university you are planning on attending has given you the following average expenses for a typical student.

<table>
<thead>
<tr>
<th>1</th>
<th>Category</th>
<th>Freshmen</th>
<th>Sophomore</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Room and Board</td>
<td>$9,047.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Books and Supplies</td>
<td>$1,137.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Personal Expenses</td>
<td>$1,589.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Transportation</td>
<td>$1,073.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Assuming a 3% increase in all expenses from year to year, finish the above worksheet showing expenses for each of your four years in college.

- Write one formula in cell C1 and fill it down and right

Problem 3.2 Better Design

- How would we change the previous worksheet from 3% to 4%?

- Below is a better design:
Problem 3.3 Meteorology

- A meteorology class found the average weekly temperature for each week of each month for one year.
- The data is on the next slide. You are to find each of the following using an Excel worksheet:
  
  - The average monthly temperature for each month.
  
  - The highest and lowest monthly averages using two functions we have not discussed yet: maximum and minimum. See if you can use the help feature to figure this out.

Let's import the data from the web

- Go to Data->From Web
  
  - Type in the following URL in the address box:
    - zeus.cs.pacificu.edu/lanec/cs130s17/WeatherTable.html
  
  - Select the second yellow arrow and click Import
  
  - Select OK
Importing from the Web

- What are the benefits of importing data from the web?
  - I can easily distribute data to you!

- What are the downsides of importing data from the web?

Problem 3.3 Continued: Charting

- Select columns Month and Week 1
- Choose Insert | Recommended Charts | Line
  - OR select circled icon and the option in upper left of dropdown menu
Add a new Series

• To add other weeks
  • Right Click on the Chart | Select Data
  • Add
  • Series Name
  • Series Values

• Edit Horizontal (Category) Axis Labels to show months.

Format the Chart

• Click on Chart -> Design | Add chart Element
  • Axis Titles
  • Chart Title
  • Legend | Right
Outside Practice

- Format the data nicely
- Add a row that calculates the average the columns containing monetary values.
- Add a row to calculate the median of those same columns.
- Add a column that shows how much more (in $) Democrats spent than Republicans each year. This number may be negative.

Outside Practice Continued

- Build a line chart that displays this data. The chart should have one line for Democrats and one line for Republicans.