Background Information

Every ten years, the United States Census Bureau conducts a constitutionally-mandated count of the residents in each state. After each census, the 435 seats in the U.S. House of Representatives are reapportioned so that each state has a number of members proportionate to its population. Each state has at least one seat, with the remaining 385 assigned based on the method of equal proportions.

At its peak, from the 1910 through the 1950 census reapportionments, West Virginia had six Congressional seats. Since that time West Virginia’s population has stagnated while the United States’ population overall has doubled. As a result, West Virginia now has only three Congressional seats. Seats were lost after the 1960, 1970, and 1990 censuses. Considering the state’s low population growth rate, there is concern as to when the state might lose another seat.

Problem Statement

In this assignment, students will explore data released by the U.S. Census Bureau over the past century. After analysis, students will make estimates and claims concerning the number of congressional seats held by West Virginia in the future.

Instructions

**IMPORTANT:** Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following file for use in this assignment:

   a. `population.csv` – Population data for selected states and nation [1], [2].

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Text</td>
<td>Name of state.</td>
</tr>
<tr>
<td>Year</td>
<td>Number</td>
<td>Year of population figure.</td>
</tr>
<tr>
<td>Seats</td>
<td>Number</td>
<td>Number of congressional seats for this state and year.</td>
</tr>
<tr>
<td>Population</td>
<td>Number</td>
<td>Population for this state and year.</td>
</tr>
</tbody>
</table>

2. Begin by creating a new Microsoft Excel workbook named `lastname_firstname_hw3_cap.xlsx`.
3. We must adjust the sheets in our workbook.
   a. Rename Sheet1 to Population.
   b. Add a new sheet named Scenarios.
   c. Add a new sheet named Analysis Questions.

4. Import the following item into the workbook:
   a. population.csv file – Import starting in cell A3 of the Population sheet.
      The file is comma-delimited and has headers.

5. We wish to apply formatting to the Population sheet.
   a. Create a table based on cells A3 through D75 using a style of your choice. The table has headers.
      The table will overlap external data ranges. Convert the selection to a table and remove all external connections.
   b. For the table, turn on the First Column option.
   c. Enter text in the cells as indicated below:
      i. A1: Population Seats
   d. Merge (but not center) cells A1 through D1.
   e. Apply the Heading 1 cell style to cell A1.
   f. Format the cells as indicated below:
      i. D4 through D75: number with no decimal places, use 1000 separator
   g. AutoFit the widths of columns A through D.

6. To better understand our data, we wish to create a PivotTable.
   a. Create a new PivotTable based on the data in cells A3 through D75 of the Population sheet. Place the PivotTable on a new sheet named Population PivotTable.
   b. On the PivotTable, do the following:
      i. Add the number of seats as a Filters field.
      ii. Add the state as a Columns field.
      iii. Add the year as a Rows field.
      iv. Add the population as a Values field.
   c. We need to perform formatting on our PivotTable.
      i. Group the years into sets of 20 starting at 1895.
      ii. Summarize the population figures by averaging them.
iii. Format the cells as indicated below:
   (1) **Average of Population** field: number with no decimal places, use 1000 separator

7. We also wish to apply formatting to the *Scenarios* sheet.
   a. Enter text in the cells as indicated below:
      i. **A1**: Population per Seat Scenarios
      ii. **A3**: Scenario
      iii. **B5**: Annual Growth Rate
      iv. **C5**: 2010
      v. **D5**: 2020
      vi. **E5**: 2030
      vii. **F5**: 2040
      viii. **G5**: 2050
      ix. **H5**: 2060
      x. **A6**: United States
      xi. **B6**: 0.93%
      xii. **C6**: 709,760
      xiii. **A7**: West Virginia
      xiv. **B7**: 0.24%
      xv. **C7**: 617,665
      xvi. **A8**: WV Population per Seat Deviation from US

   b. Merge (but not center) cells **A1** through **H1**.
   c. Apply the **Heading 1** cell style to cell **A1**.
   d. Apply background fill colors to the cells as indicated below:
      i. **A5** through **H5**: *Blue, Accent 1, Lighter 40%*
      ii. **A8** through **H8**: *White, Background 1, 25% Darker*
   e. Format the cells as indicated below:
      i. **B6** through **B7**: percentage with 2 decimal places
      ii. **C6** through **H8**: number with no decimal places, use 1000 separator
   f. AutoFit the width of columns **A** through **B**. Set the width of columns **C** through **H** to 12 (1.06”).
8. On the Scenarios sheet, we wish to calculate information about median populations and estimates.
   a. We wish to determine the deviation in population per seat between West Virginia and the United States. Enter the formulas in the cells as indicated below:
      i. \( C8 = C7 - C6 \)
      ii. \( C8 \) through \( H8 \): AutoFill the formula from cell \( C8 \).
   b. We want to estimate future population scenarios.
      i. Enter the formula into the cell indicated below.
         \( HINT: \) To avoid errors, copy-and-paste the provided formula.
            (1) \( D6 = C6 \times (1+B6)^{10} \)
      ii. We must adjust the future values formula so its cell references are correct when the formula is copied.

         In cell \( D6 \), modify the cell references so they are column-absolute mixed or relative references as indicated:

         \( =C6 \times (1+B6)^{10} \)

         iii. We will now AutoFill the modified formula. Enter the formula into the cells as indicated below.
             (1) \( D6 \) through \( H7 \): AutoFill the formula from cell \( D6 \).

9. We will now evaluate two different scenarios for population growth in West Virginia and the United States.
   a. The first scenario involves the current annual growth rate for West Virginia.
      i. Enter text in the cells as indicated below:
         (1) \( A3 \): Current Growth Rate
         (2) \( B7 \): 0.24%
ii. There is nothing to do for this step. Please proceed to the next step.

iii. Using Scenario Manager, create a new scenario named **Current Growth Rate**. Have the scenario work by changing the values of cells **A3** and **B7** to the values they contain now.

b. The second scenario involves West Virginia closing the gap with the population per seat for the rest of the United States.

   i. Enter text in the cells as indicated below:

      (1) **A3**: Closing Gap between WV and US

      (2) **B7**: 0.00%

   ii. Use Goal Seek to find an annual population growth rate for West Virginia to achieve a deviation of 0 in cell **H8**. Have Goal Seek change the value of cell **B7** until it locates the correct value.

   iii. Using Scenario Manager, create a new scenario named **Closing Gap**. Have the scenario work by changing the values of **A3** and **B7** to the values they contain now.

10. We need to set up the **Analysis Questions** sheet so that it can store responses to the analysis questions.

    a. Enter text in the cells as indicated below:

       i. **A1**: Question Number

       ii. **B1**: Response

    b. Bold the contents of row 1.

    c. AutoFit the width of column **A**. Set the width of column **B** to 100 (8.39”).

    d. Set the height for rows 2 through 5 to 110 (1.53”).

    e. Change the vertical alignment setting for columns **A** and **B** so that the text is displayed at the top of each row.

    f. Turn on text wrapping for column **B**.

11. Starting in row 2 of the **Analysis Questions** sheet, answer four of the five analysis questions below. Respond to one question per row.

    a. How might the balance of political power in a state influence redistricting when the state loses seats?

    b. The annual growth rate for the population in West Virginia is one of the nation’s lowest at 0.24%. Why do you think other states, for example, Virginia, have nearly four times this growth rate?

    c. Why is it important for the U.S. Census to collect population data, especially during each decennial census?
d. How are the Electoral College, Popular Vote and reapportionment process related in the context of a presidential election? What is the purpose of the Electoral College?

e. Based on the assignment data, do you think West Virginia will lose another seat soon? If so, how soon?

**Grading Rubric**

This assignment is worth 50 points. It will be graded by your instructor using this rubric, with partial credit awarded as appropriate:

<table>
<thead>
<tr>
<th>Step 3a-c</th>
<th>1 points total</th>
<th>Steps 8a-b</th>
<th>6 points total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 4</td>
<td>2 points</td>
<td>Steps 9a-b</td>
<td>10 points total</td>
</tr>
<tr>
<td>Steps 5a-g</td>
<td>4 points total</td>
<td>Steps 10a-f</td>
<td>3 points total</td>
</tr>
<tr>
<td>Steps 6a-c</td>
<td>10 points total</td>
<td>Steps 11a-e (pick 4 of 5)</td>
<td>2.5 points each</td>
</tr>
<tr>
<td>Steps 7a-f</td>
<td>4 points total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis questions in Steps 11a-e will be evaluated using this rubric:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Meets Requirements (1.25 points)</th>
<th>Does Not Meet Requirements (0 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer is reasonable.</td>
<td>Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.</td>
<td>Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.</td>
</tr>
<tr>
<td>Answer is supported.</td>
<td>Logical rationale is provided to support the given answer.</td>
<td>Logical rationale is not provided to support the given answer.</td>
</tr>
</tbody>
</table>

**Acknowledgments**

The image in the introduction appears courtesy of the West Virginia Legislature [3].

**References**

