



# Homework #2 Help

## Charleston MSA Problem

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### Background Information

It is often in a city's best interest to have more residents. A larger population generally yields a larger tax base and more income. A large-enough population can also yield Metropolitan Statistical Area (MSA) status, which brings eligibility for some federal programs and can also help put an area "on the radar" for potential businesses.



Since the 1990s, an MSA has either had to have a core city with a population of 50,000 or an urbanized area with at least 75,000 people [1]. As of the 2010 census, Charleston, West Virginia was just above the city-only threshold at a population of 51,400 [2]. By 2020, the population was just 48,864, potentially risking Charleston's MSA status [3]. Further compounding concerns about population is that Charleston's residents are somewhat older than average, with a median age of 42.2 years versus 38.5 nationally [3].

### Problem Statement

In this assignment, students will explore the demographics of Charleston and its surrounding area to understand how the city could be affected by the population threshold for Metropolitan Statistical Area status.

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### Instructions

**WARNING:** This is not the actual Homework for your section. You will not receive any credit for completing this project.

**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.



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1. Download and extract the provided Data Files ZIP file. It contains the following file for use in this assignment:
  - a. **population.csv** – Population and demographics information for the Charleston, West Virginia area [3], [4].

Column Name	Type	Description
<b>Location</b>	Text	Name of location.
<b>Year</b>	Number	Year of population figure.
<b>Age Group</b>	Text	Age group for population figure.
<b>Female Population</b>	Number	Female population for the specified location, year, and age group.
<b>Male Population</b>	Number	Male population for the specified location, year, and age group.
<b>Male+Female Population</b>	Number	Total population (both male and female) for the specified location, year, and age group.

2. Create a new Microsoft Excel workbook named **hwhelp2\_cmsap\_lastname\_firstname.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. Its first row contains headers.
5. We wish to apply formatting to the *Population* sheet.
  - a. We must set up a table to store data on population.
    - i. If a table does not already exist in cells **A3** through **F103**, create one using a style of your choice. The table has headers and will overlap external data ranges. If prompted, convert the selection to a table and remove all external connections.
    - ii. If a table already exists in cells **A3** through **F103**, format the table using a style of your choice other than the default table style.
  - b. We need to add additional table columns to store statistics.
    - i. Insert four new table columns to the right of existing column **F**.
  - c. For the table, turn on the **First Column** option.
  - d. Enter text in the cells as indicated below:
    - i. **A1**: Charleston Area Population



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- ii. **G3**: Min Population
  - iii. **H3**: Max Population
  - iv. **I3**: Max-Min Ratio
  - v. **J3**: Ratio Under 1.2
- e. Merge (but not center) cells **A1** through **J1**.
  - f. Apply the *Heading 1* cell style to cell **A1**.
6. On the *Population* sheet, we wish to calculate population statistics.
- a. In column **G**, write a formula to calculate the minimum population between males and females for the location, year, and age group.
  - b. In column **H**, write a formula to calculate the maximum population between males and females for the location, year, and age group.
  - c. In column **I**, write a formula to calculate, for each location, year, and age group, the ratio between the maximum and minimum population.
- You can calculate the ratio using the formula:
- $$\frac{[Max\ Population]}{[Min\ Population]}$$
- d. In column **J**, write a formula to determine if the population ratio was less than 1.2. If it was, display *Under 1.2*; otherwise, display *Not Under 1.2*.
7. We must apply additional formatting to the *Population* sheet.
- a. Format the cells as indicated below:
    - i. **D4** through **H103**: number with no decimal places, use 1000 separator
    - ii. **I4** through **I103**: number with 2 decimal places
  - b. AutoFit the widths of columns **A** through **J**.
  - c. Apply *Green-Yellow-Red* color scale conditional formatting to cells **F4** through **F103**.
8. To better understand our data, we wish to create a PivotTable.
- a. Create a new PivotTable based on the data in cells **A3** through **J103** of the *Population* sheet. Place the PivotTable on a new sheet named *Population PivotTable*.
  - b. On the PivotTable, do the following:
    - i. Add the age group as a **Filters** field.
    - ii. Add the year as a **Rows** field.



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- iii. Add the location as a **Columns** field.
- iv. Add the combined male and female population as a **Values** field.
- c. We need to perform formatting on our PivotTable.
  - i. Group the years into sets of 10 starting at 1991.
  - ii. Summarize the population figures by summing them.
  - iii. Format the cells as indicated below:
    - (1) **Belle, Charleston, Chesapeake, Marmet, and Remainder of Kanawha County** fields: number with no decimal places, use 1000 separator
9. We also wish to apply formatting to the *Scenarios* sheet.
  - a. Enter text in the cells as indicated below:
    - i. **A1:** Population Scenarios
    - ii. **A3:** Scenario
    - iii. **B5:** Annual Growth Rate
    - iv. **C5:** 2022
    - v. **D5:** 2023
    - vi. **E5:** 2024
    - vii. **F5:** 2025
    - viii. **G5:** 2026
    - ix. **H5:** 2027
    - x. **I5:** 2028
    - xi. **J5:** 2029
    - xii. **K5:** 2030
    - xiii. **L5:** 2031
    - xiv. **M5:** 2032
    - xv. **A6:** Population Threshold
    - xvi. **B6:** 0%
    - xvii. **C6:** 50000
    - xviii. **A7:** Charleston Population
    - xix. **B7:** 0%



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- xx. **C7**: 48415
  - xxi. **A8**: Amount above Threshold
  - b. Merge (but not center) cells **A1** through **M1**.
  - c. Apply the *Heading 1* cell style to cell **A1**.
  - d. Apply background fill colors to the cells as indicated below:
    - i. **A5** through **M5**: *Accent 1, Lighter 40%*
    - ii. **A8** through **M8**: *Background 1, Darker 25%*
  - e. Format the cells as indicated below:
    - i. **B6** through **B7**: percentage with 2 decimal places
    - ii. **C6** through **M8**: number with no decimal places, use 1000 separator
  - f. AutoFit the width of columns **A** through **B**. Set the width of columns **C** through **M** to 7.
10. On the *Scenarios* sheet, we wish to calculate information about possible population in the future.
- a. We wish to compute the gap between Charleston's population and the population threshold. Enter the formulas in the cells as indicated below.
    - i. **C8**:  $=C7-C6$
    - ii. **C8** through **M8**: 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**:  $=C6*(1+B6)$

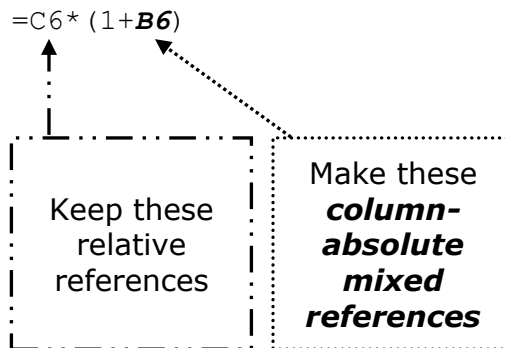


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- ii. We must adjust the future values formula so its cell references are correct when the formula is copied.

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



- iii. We will now AutoFill the modified formula. Enter the formula into the cells as indicated below.

(1) **D6** through **M7**: AutoFill the formula from cell **D6**.

11. We will now evaluate two different scenarios for Charleston's population.

- a. The first scenario involves an -0.44% annual change, the same rate as from 2000 to 2020.

- i. Enter text in the cells as indicated below:

(1) **A3**: Historic Growth Rate

(2) **B7**: -0.44%

- ii. There is nothing to do for this step. Please proceed to the next step.

- iii. Using Scenario Manager, create a new scenario named *Historic 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 a growing to a population of 52,500 in 2032, which is 5% above the threshold.

- i. Enter text in the cells as indicated below:

(1) **A3**: 5% Above Threshold

(2) **B7**: 0.00%

- ii. Use Goal Seek to find an annual growth rate to achieve a population of 2,500 above the threshold in cell **M8**. Have Goal Seek change the value of cell **B7** until it locates the correct value.



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- iii. Using Scenario Manager, create a new scenario named *5% Above Threshold*. Have the scenario work by changing the values of **A3** and **B7** to the values they contain now.
12. 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.
  - d. Set the height for rows **2** through **4** to 110.
  - 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**.
13. Starting in row **2** of the *Analysis Questions* sheet, answer three of the five analysis questions below. Respond to one question per row.
- a. Based on the age group populations shown in the dataset, do you think that Charleston could have enough new births to cause a net increase in its population? Why or why not?
  - b. How is Charleston's population changing relative to that of the rest of Kanawha County?
  - c. Do you think that the growth rate calculated by Goal Seek in the second scenario is attainable? Why or why not?
  - d. Other than merging with other area cities and towns, what sort of things could Charleston do to help boost its population? List one or two ideas.
  - e. On a national perspective, what sort of relationship exists between the country's rising total population and the number of cities meeting the 50,000 threshold for Metropolitan Statistical Area status? What would happen if the thresholds were adjusted to become a percentage of the country's total population rather than a fixed number?



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### Grading Rubric

This is a practice assignment and is worth no points. A comparable Homework would be worth 60 points and graded using this rubric, with partial credit awarded as appropriate:

Steps 3a-c	2 points total	Steps 9a-f	4 points total
Step 4	2 points	Steps 10a-b	8 points total
Steps 5a-f	2 points total	Steps 11a-b	6 points total
Steps 6a-d	10 points total	Steps 12a-f	4 points total
Steps 7a-c	3 points total	Steps 13a-e (pick 3 of 5)	3 points each
Steps 8a-c	10 points total		

The analysis questions in Steps 13a-e will be evaluated using this rubric:

Standard	Meets Requirements (1.5 points)	Does Not Meet Requirements (0 points)
Answer is reasonable.	Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.	Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.
Answer is supported.	Logical rationale is provided to support the given answer.	Logical rationale is not provided to support the given answer.

### Acknowledgments

The image in the introduction appears courtesy of Analogue Kid [5].

### References

- [1] *Geographic Areas Reference Manual*. U.S. Census Bureau, 1994. Available: <https://www2.census.gov/geo/pdfs/reference/GARM/>.
- [2] "2010 Census Summary File 1 Dataset," *U.S. Census Bureau*, Jun. 16, 2011. Available: <https://www.census.gov/data/datasets/2010/dec/summary-file-1.html>.
- [3] "American Community Survey 5-Year Data (2009-2022)," *U.S. Census Bureau*. Available: <https://www.census.gov/data/developers/data-sets/acs-5year.html>. Accessed: Dec. 08, 2023.
- [4] "2000 Census Summary File 1 Dataset," *U.S. Census Bureau*, Jun. 13, 2001. Available: <https://www.census.gov/data/datasets/2000/dec/summary-file-1.html>.
- [5] Analogue Kid, *State Capitol of West Virginia*. 2006. Available: <https://commons.wikimedia.org/wiki/File:Wvstatecapitalbldg.JPG>.