



## Topics

- Use the `SUMIF` and `AVERAGEIF` functions
- Use the `VLOOKUP` function
- Use the `PMT/FV` function
- Use the `CONCATENATE` function

## Background Information

This project includes information on coal mining in West Virginia from 1994 to 2014.

## 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 files for use in this assignment:
  - a. **mining\_ppff3\_wvmp.xlsx** – Information on coal mining in West Virginia [1], [2].

<b>Sheet: Coal Mined</b>		
<b>Column Name</b>	<b>Type</b>	<b>Description</b>
<b>County</b>	Text	Name of the West Virginia county.
<b>Region</b>	Text	Region where the county is located.
<b>1994</b>	Number	Tons of coal mined in the county in 1994.
<b>1999</b>	Number	Tons of coal mined in the county in 1999.
<b>2004</b>	Number	Tons of coal mined in the county in 2004.
<b>2009</b>	Number	Tons of coal mined in the county in 2009.
<b>2014</b>	Number	Tons of coal mined in the county in 2014.
<b>Pctg of Total Mined</b>	Percentage	Percentage of all coal mined in 2014 that was mined in the county.
<b>2014 Top 10 County</b>	Text	Indication if the county ranked in the top 10 for coal mined in 2014.
<b>1994+ Top 10 County</b>	Text	Indication if the county ranked in the top 10 for coal mined any time 1994 or later.



# Formulas & Functions III

## WV Mining Problem

<b>Sheet: Prices</b>		
<b>Column Name</b>	<b>Type</b>	<b>Description</b>
<b>County</b>	Text	Name of the West Virginia county.
<b>Region</b>	Text	Region where the county is located.
<b>1994</b>	Currency	Per-ton price of coal sold in 1994.
<b>1999</b>	Currency	Per-ton price of coal sold in 1999.
<b>2004</b>	Currency	Per-ton price of coal sold in 2004.
<b>2009</b>	Currency	Per-ton price of coal sold in 2009.
<b>2014</b>	Currency	Per-ton price of coal sold in 2014.
<b>Average Price</b>	Currency	Average of coal prices during the period 1994-2014.
<b>Inflation-Adjusted 1994</b>	Currency	Empty column.
<b>2014 Rank</b>	Number	Rank of coal prices in 2014.
<b>2014 Rank Class</b>	Text	Indication of the county's coal prices are in the top, middle, or bottom third.
<b>Coal Pricing</b>	Text	Relative indication of coal prices in 2014.

<b>Sheet: Total Values</b>		
<b>Column Name</b>	<b>Type</b>	<b>Description</b>
<b>County</b>	Text	Name of the West Virginia county.
<b>Region</b>	Text	Region where the county is located.
<b>1994</b>	Currency	Total value of coal mined in 1994.
<b>1999</b>	Currency	Total value of coal mined in 1999.
<b>2004</b>	Currency	Total value of coal mined in 2004.
<b>2009</b>	Currency	Total value of coal mined in 2009.
<b>2014</b>	Currency	Total value of coal mined in 2014.
<b>Coal Pricing</b>	Text	Empty column.
<b>2009-2014 Change</b>	Text	Indication if the total value increased between 2009 and 2014.
<b>Sparkline</b>	Sparkline	Empty column.
<b>County (Region)</b>	Text	Empty column.



<b>Sheet: Forecasts</b>		
<b>Column Name</b>	<b>Type</b>	<b>Description</b>
<b>Region</b>	Text	Region where the county is located.
<b>1994 Tons</b>	Number	Tons of coal mined in the region in 1994.
<b>1999 Tons</b>	Number	Tons of coal mined in the region in 1999.
<b>2004 Tons</b>	Number	Tons of coal mined in the region in 2004.
<b>2009 Tons</b>	Number	Tons of coal mined in the region in 2009.
<b>2014 Tons</b>	Number	Tons of coal mined in the region in 2014.
<b>2019 Tons</b>	Number	Forecasted tons of coal mined in the region in 2019.
<b>2019 Price</b>	Currency	Forecasted per-ton price of coal in 2019.
<b>2019 Total Coal Value</b>	Currency	Forecasted total value of coal mined in 2019.

<b>Sheet: Analysis Questions</b>		
<b>Column Name</b>	<b>Type</b>	<b>Description</b>
<b>Question Number</b>	Text	Question being answered.
<b>Response</b>	Text	Response to the analysis question prompt.

- Open the **mining\_ppff3\_wvmp.xlsx** workbook in Microsoft Excel.

### Use the **SUMIF** and **AVERAGEIF** functions

- On the *Forecasts* sheet, we want to calculate the tons of coal mined in each region for each year.
  - Use the `SUMIF()` function to determine the number of homes in each region for each year using information from the *Coal Mined* sheet. Enter the formula into the cells as indicated below.
    - B6:** `=SUMIF('Coal Mined'!$B$4:$B$58,$A6,'Coal Mined'!C$4:C$58)`

**NOTE:** The new formula will overwrite the existing value in this cell.
    - B6** through **F15:** AutoFill the formula from **B6**.

**NOTE:** The new formula will overwrite the existing values in these cells.
  - Use the `AVERAGEIF()` function to determine the average price for each region using information from the *Prices* sheet. We will multiply the average by  $1.018^5$  to adjust for inflation through 2019. Enter the formula into the cells as indicated below.
    - H6:**  
`=AVERAGEIF(Prices!$B$4:$B$58,$A6,Prices!$G$4:$G$58)*1.018^5`



- ii. **H6** through **H15**: AutoFill the formula from **H6**.

### Use the VLOOKUP function

4. On the *Total Values* sheet, we want to duplicate the coal pricing information from the *Prices* sheet.
- a. Use the `VLOOKUP()` function to retrieve the matching coal pricing information from the *Prices* sheet. Enter the formula into the cells as indicated below.
- i. **H4**: `=VLOOKUP(A4, Prices!$A$4:$L$58, 12)`
- ii. **H4** through **H58**: AutoFill the formula from cell **H4**.

### Use the PMT/FV function

5. On the *Prices* sheet, we want to adjust the 1994 coal prices for inflation to 2014.
- a. In column **I**, use the `FV()` function to adjust the coal price in 1994 to 2014. Assume 2.38% annual inflation for 20 years. Use the 1994 coal price as the present value. Display the result as a positive number.

### Use the CONCATENATE function

6. On the *Total Values* sheet, we want to create a single field containing both the county name and region name.
- a. In column **K**, use the `CONCATENATE()` function to create a new text string combining the county and region names in the format *County (Region)*.
7. Starting in row **2** of the *Analysis Questions* sheet, answer the analysis question below. Respond to one question per row.
- d. What is the relationship between actual 2014 prices and if we adjust the 1994 prices for inflation to 2014? What might the difference signify?

## Grading Rubric

This assignment is worth 8 points. It will be graded by your instructor using this rubric:

Standard	Meets Requirements (8 points)	Does Not Meet Requirements (0 points)
Student made reasonable effort in correctly completing assignment.	Assignment is at least 70% complete and correct, or student contacted instructor for help on incorrect or incomplete items.	Assignment is less than 70% complete and correct, and student did not contact instructor for assistance on incorrect or incomplete items.



# Formulas & Functions III

WV Mining Problem

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This rubric will be used for peer evaluation of this assignment:

Standard	Excellent	Satisfactory	Needs Improvement
Assignment is correct and complete.	Assignment is at least 90% complete and correct.	Assignment is 70%-89% complete and correct.	Assignment is less than 70% complete and correct.

The analysis question in Step 7d will be evaluated using this rubric:

Standard	Meets Requirements	Does Not Meet Requirements
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.

## References

- [1] "West Virginia Mining Statistics," *West Virginia Office of Miners' Health, Safety and Training*, Apr. 14, 2016. Available: <http://www.wvminesafety.org/STATS.HTM>.
- [2] "Annual Coal Report," *Energy Information Administration*, Mar. 23, 2016. Available: <http://www.eia.gov/coal/annual/>.