Lake Mead: Second Fundamental Theorem

In this Lab you will write Python code and run it. You can write the code yourself or get an LLM to do it. Run the code in Google Colab. If it does not run correctly, rewrite until it works correctly.

Purpose of Lab
To use definite integrals and analyze the capacity of Lake Mead at different water levels.

Part 1
The file *LakeMeadAreas.csv* gives the cross section area of the lake in 2001 at an elevation h in feet above sea level. Let $A(h)$ be the area of the lake in square feet at elevation h.
1. Write a definite integral representing the volume of the lake if the water level is reaches an elevation of H feet.
2. Would you expect the volume, $V(H)$ to be an increasing or decreasing function of H? Concave up or concave down? Explain in terms of water and lakes.

Part II
3. Write Python code to estimate the definite integral for the volume in cubic feet for a water level at H feet. (There are 43,560 square feet in an acre.) Plot the volume as a function of H.

Part III
4. Explain what your code does using in-line comments (the kind that start with a '#'). You can either add one comment per line or if multiple lines can be adequately explained with a single comment, you may do that instead.

Hand In on Gradescope
 Your **Google Colab .ipynb** file. Use download to .ipynb in Google Colab or another method.

Grading
 • A successful run of code showing output.
 • Your code explanations. This part will be worth most of the points.