**Capacity of Lake Mead**

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 Riemann Sums to approximate the volume of Lake Mead.

Part 1
To find the volume of Lake Mead, we use the cross sectional area of the water at various depths. These areas were first estimated from topographical maps before the lake was created, and more recently by LiDAR. The map shows the cross section of the lake at several elevations above sea level in 2001[1]

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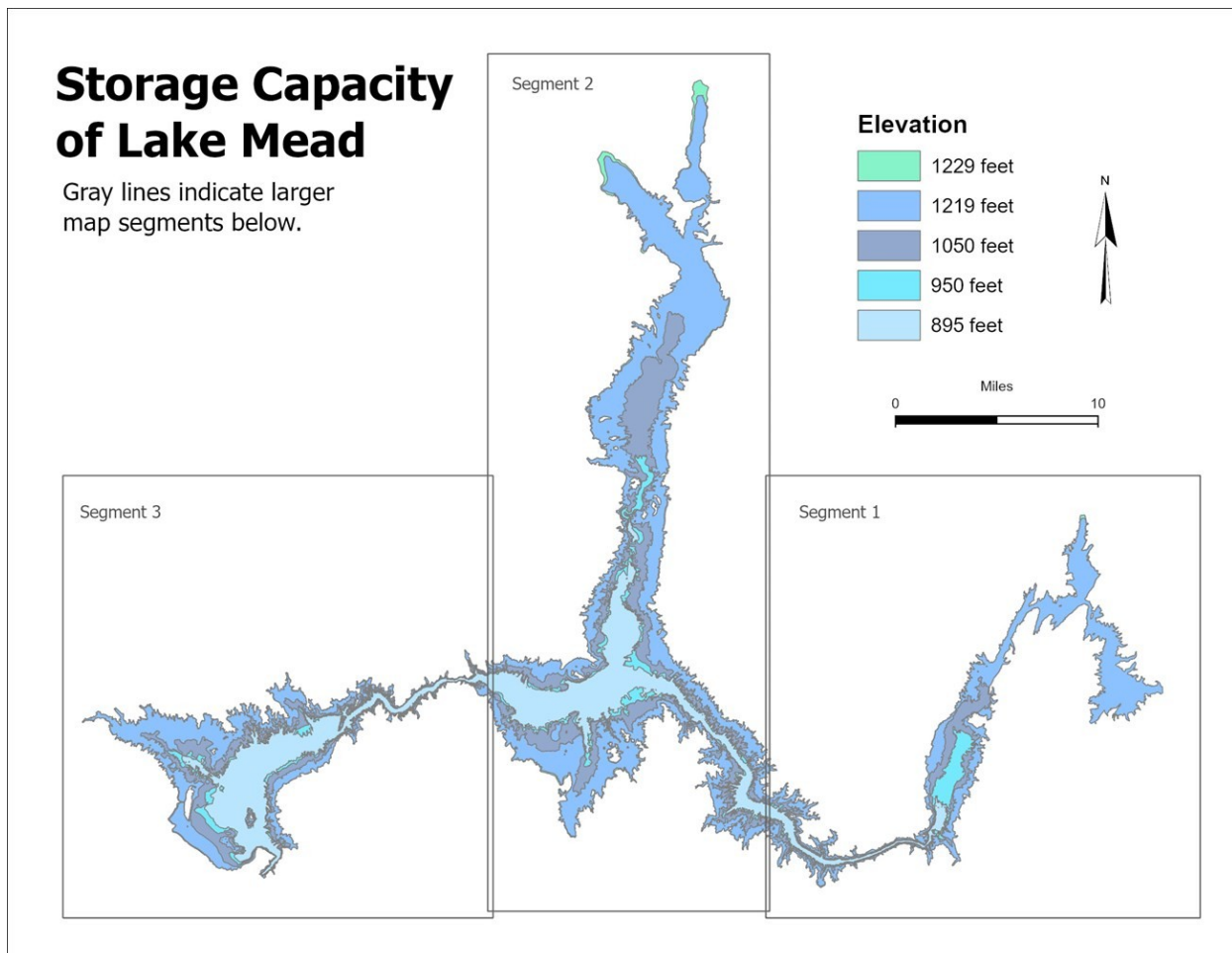
[1] Image from the National Park Service, at https://home.nps.gov/lake/learn/nature/storage-capacity-of-lake-mead.htm

The file *LakeMeadAreas.csv* gives the cross section area of the lake in 2001 at elevations h in feet above sea level.
1. What was the elevation of the bottom of the lake?
2. The elevation of the top of the dam is 1230 feet. What is the maximum possible depth of the lake?
3. If $A(h)$ is the area of the lake in square feet at elevation h, write a definite integral with limits representing the maximum possible volume of the lake in 2001.

Part II
4. At the end of 2001, the water level in the lake was at an elevation of 1175 feet. Write Python code to estimate the volume of water in cubic feet at that time. (There are 43,560 square feet in an acre.) Run the code.
5. In November 2022, the depth of Lake Mead was 1030 feet. What was the volume then?

Part III
6. 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.