# Problem Statement: Part 1

- **Boulder Reservoir needs an updated survey of its terrain**
  - The latest results from a brief SONAR scan across a strip of the reservoir's floor has arrived.
    - "depth_data.csv"
  - Assume that this strip accurately represents the rest of reservoir floor along the length, L.
  - Use the Trapezoid and Simpson's 1/3 Methods to find the cross-sectional area of this portion of the reservoir
  - Extrude this area out to L in order to estimate the total volume of the Reservoir.
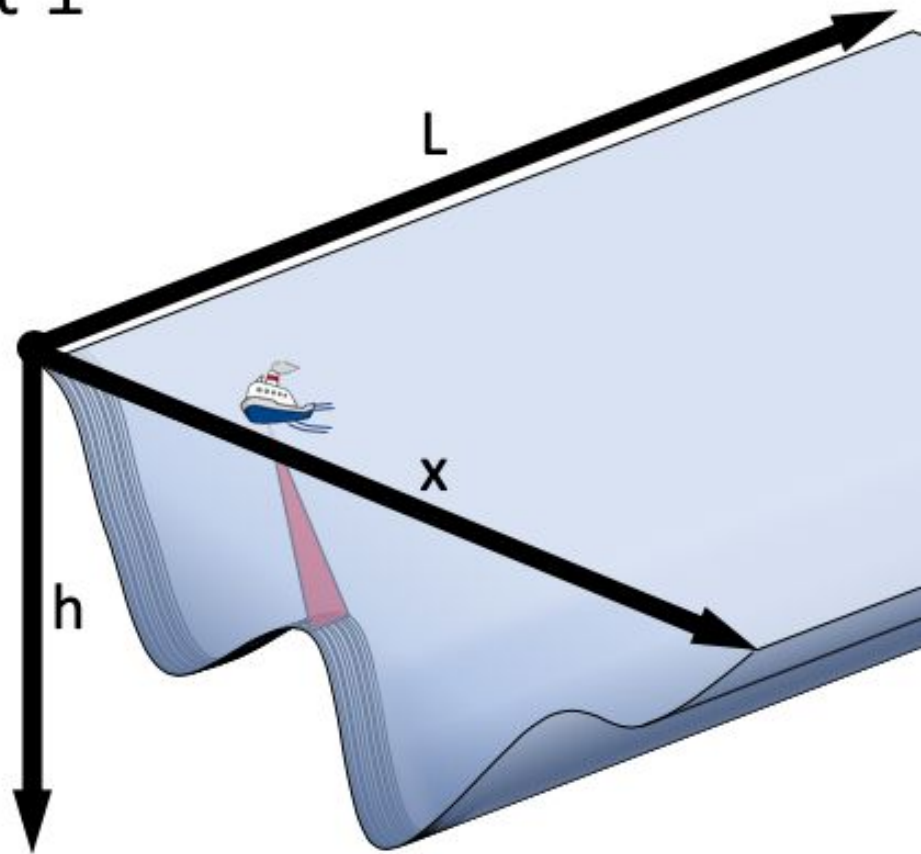
Givens and Deliverables: Part 1

- Given
  - depth_results.csv
    - 1st column is the position, x, on the reservoir when measurement was taken [ft]
    - 2nd column is the depth, d, of the reservoir [ft]
 - L = 4836 ft

- Deliverables
  - Calculate volume using Trapezoid Rule
  - Calculatee volume using Simpson 1/3 Method
  - Though you not given the true volume of the reservoir, which one of these two calculations are more accurate?

Problem Statement: Part 2

- **Boulder Reservoir has sprung a LEAK!**
  - Dam operators report that the outward flow of water is proportional to the reservoir's water level.
    - $\dot{V}_{out} = \alpha h$, where α = 1.5e6 [ft²/day]
  - To prevent the reservoir running dry, 20 million cubic feet of water is poured into the reservoir every day.
    - $\dot{V}_{in}$ = 2e7 [ft³]
  - Use the Euler Explicit Method to find if the the water level stabilizes, and if so, what water level does it stabilize at.
  - Test the accuracy of the Euler Explicit Method by using Δt values of 7 days, 4 days, 1 day, and 0.5 days. Which Δt yields the highest accuracy?
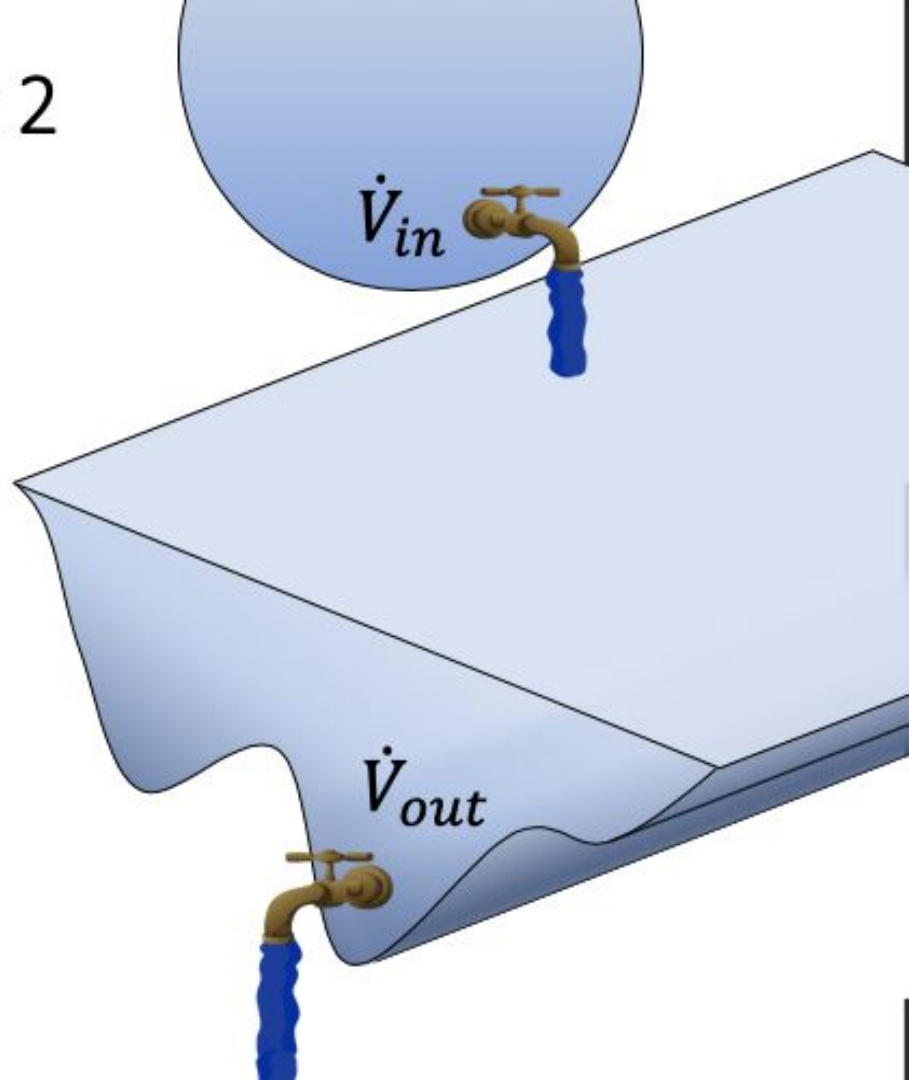
Givens and Deliverables: Part 2

- Given
  - [V, dVdh] = get_Volume(h,L)
    - Download this function from Canvas
    - Input h, the current water level; and L, the reservoir's length (same as before).
  - h(t = 0 days) = 20 ft.
  - α = 1.5e6 ft²/day
  - $\dot{V}_{in}$ = 2e7 ft³/day

- Deliverables
  - Propagate out the reservoir's depth using Δt values of 7 days, 4 days, 1 day, and 0.5 days.
  - Plot the depth vs. time for each of the Δt values tested.
  - Which Δt value leads to the most accurate results?

Coding Challenge Rubric

Points Possible	Expectations
1	Present and collaborating with group members.
1	Submitted code that runs without errors.
1	Code is neat, commented, **file name follows naming convention, and is properly published and submitted.**
2	Code properly completes all outlined tasks
Total: 5	If all expectations are met 5/5 points will be awarded.