Water Tower Exercise

Water towers store treated water and create sufficient pressure on its release to move it through the water system without allowing contamination. The pressure created is calculated using a simple formula. In this exercise, you will build a simple model to simulate the water pressure at different water tower heights. The model will be used to determine tower height to create 50 psi water pressure in a pipe at the base of the water tower.

The pressure is a function of the density of water, the acceleration of the water as it descends due to the force of gravity, and the height of the tower.

The formula for pressure is:

$P = \rho gh$

Where:

P = water pressure at the base of the water tower (lb/ft^2)

ρ = density of water $(1.94\ slugs/ft^2)$

g = acceleration due to gravity $(32.3ft/s^2)$

h = height of water above ground

Annotated starting files are provided for both MATLAB and Python to help you create this simple model. You will calculate the pressure as a function of each foot of tower height. The vector of pressures then need to be converted from pounds per square foot to pounds per square inch and the final table written out to allow you to choose the final water tower height.

1. Complete the model and decide what the appropriate water tower height should be.
2. Solve the model analytically and compare your answer to the simulated values.