Math 152 – Python Lab 3

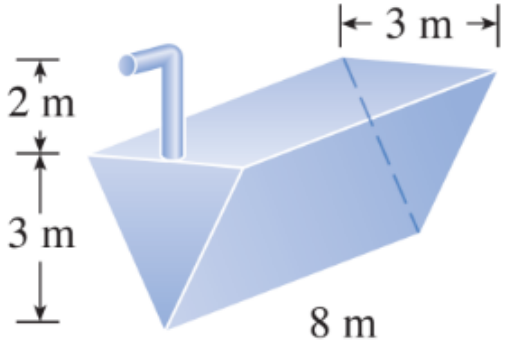
Directions: Use Python to solve each problem, unless the question states otherwise. For this lab, approximate answers are acceptable for all non-plotting questions. (Template link)

1. Given $f(x) = \sqrt{x}$ and $g(x) = (x-3)^2$,
   (a) Plot both functions on the same axes, with x-interval $[0, 5]$.
   (b) Find the volume of the solid generated by rotating the region bounded by the two curves around the line $x = 0.5$.
   (c) Find the volume of the solid generated by rotating the region bounded by the two curves around the line $y = 5$.

2. Given $f(x) = 2e^{x^2}$ and $g(x) = 4x + 2$,
   (a) Plot both functions on the same axes with x-interval $[0, 1.5]$.
   (b) Find the volume of the solid whose base is the region bounded by the two curves, and cross-sections perpendicular to the x-axis are squares.

3. A tank is full of water (see figure to the right, taken from your calculus textbook).

   Recall that the density of water is $\rho = 1000$ kg/m^3 and the acceleratioon due to gravity is g $= 9.8$ m/s^2.



   (a) How much work is needed to completely empty the tank?
   (b) Suppose the pump breaks down after only 705,600 J of work has been done. Use the **sp.solve** command to find the depth of the water remaining in the tank.