TEXAS A&M UNIVERSITY
Mathematics

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 $x = 1$.

   (c) Find the volume of the solid generated by rotating the region bounded by the two curves around the line $y = 4$.

2. Given $f(x) = 2e^{x^2}$ and $g(x) = 3x + 2$,

   (a) Plot both functions on the same axes with x-interval $[0, 1]$.

   (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 equilateral triangles.

3. A spherical tank full of oil has a radius of 20m and has a 2m spout at the top. Note that the density of the oil is $\rho = 900$ kg/m^3 and the acceleratioon due to gravity is g $= 9.8$ m/s^2.

   (a) How much work is needed to pump all of the oil out of the top of the tank?

   (b) How much work is needed to pump just enough oil out the top so the remaining oil has a depth of h meters?