

ENGR 1204 Programming Languages in Engineering

MATLAB Lab 1 (Water Tank Problem: Scalar Approach)

Note: For all labs and assignments copy and paste into a Word file your program (script file), the relevant command window and plots if applicable. Try to condense the print-out as best as possible.

Write a MATLAB program (.m script file) to calculate the time to drain a cylindrical water tank for an initial water height ranging from 1 to 10 feet. The tank has a radius (rt) of 2 feet and the drain radius (ro) is 0.3 inch. The gravitational constant is 32.2 feet/sec.²

The formula for time to drain the tank is

$$\text{time} = (r_t / r_o)^2 h / v_{\text{avg}}$$

$$\text{where } v_{\text{avg}} = 0.5 (2 g h)^{1/2} \quad (\text{average velocity})$$

In your program, assign the values shown to rt, ro, and g. Convert ro to feet using a separate statement. Use **input** to prompt the user to enter the value of h when the program runs. The program should calculate but not display vavg, and then calculate and display time **in hours**. Use formatted print (fprintf) to display the time with two significant fractional digits. A sample print-out is shown below:

Run the program repeatedly for initial water heights of 1, 2, 3, ..., 10 feet.

Sample print-out (for first value of h):

Initial height of water (ft.) = 1
The time to drain the tank is 0.44 hours