BEN 580: Computational Methods in Biomedical Engineering
Assignment One Problem 1.9 Revision

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1 Problem 1.9

Problem 1.9 requires the use of Euler's Method to solve for the depth, y, from $t = 0$ to $10d$ with a step of $0.5d$. Some parameter values are given, including that $A = 1250m^2$, $Q = 250m^3/d$, and the initial condition of $y = 0$. Below is the equation for depth, given that the surface area, A, is constant. The second equation, which is the solution to the ODE, is then modeled in MATLAB to solve for the depth at time $t = 0$ to $10d$.

$$\int \frac{dy}{dt} = \int \left(\frac{3Q}{A} \sin^2 t - \frac{Q}{A} \right) dt$$

$$dydt = 3 * (\frac{Q}{A}) * (\sin^2 t) - (\frac{Q}{A})$$

The MATLAB code used to solve for this is relatively simple. First, the constraints are defines, the equation is inputted, a for loop runs over the equation at different time points, and the results are plotted. Conceptually, iot makes sense for the slope to be positive due to the fact that at y = 0, the tank is half full.

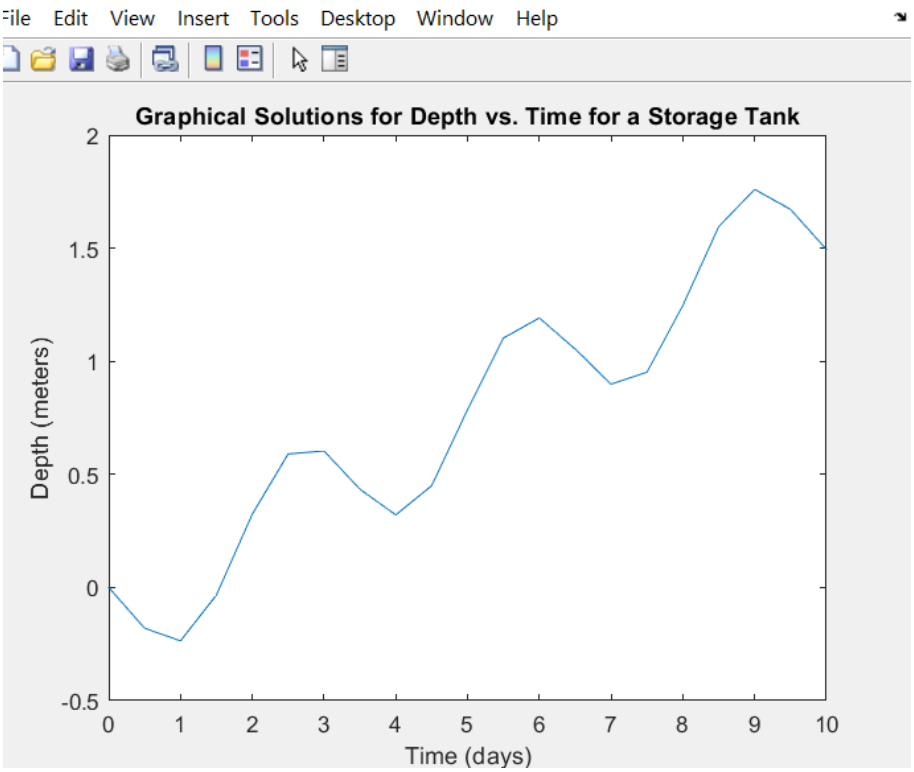

Figure 1: Results Graph from MATLAB for Problem 1.9