Write up careful and complete solutions. You must do more than get the correct answer. You must be able to explain the reasoning that led to your answer. Credit will not be given if your explanation is word for word identical to that given by someone else.

1. (a) Use VisualDSolve (or another computer package) to create a slope field for the differential equation
\[ \frac{dy}{dt} = 2\cos t - t \cdot y \]
for \(0 \leq t \leq 8\). Sketch the solution curve that passes through the point \((0, 2)\).

(b) Plot an Euler method approximation to the solution curve with initial condition \(y(0) = 2\) using 20 steps of length 0.4.

(c) Plot the Euler method approximations to this curve with 40 steps of length 0.4 and with 80 steps of length 0.2. Describe the changes you see as the number of steps increases.

(d) Recalculate the Euler method approximation using only 10 steps of length 0.8. Describe what is happening and why. Pay attention to the scales on your plot.

2. Create a slope field for the differential equation
\[ \frac{dy}{dt} = y(1 - y) \]
for \(0 \leq t \leq 8\). Use Euler’s method to find a solution curve that passes through the point \((0, 1)\). What step size should you use? What do you expect to be the limit of \(y(t)\) as \(t\) goes to \(+\infty\)? Explain any and all reasons that support this guess.