MATH 284 Mathematical Programming
Homework 8: Due Wednesday April 25 at 1:00pm

Exercises:

1. Modify the MATLAB live script `firstOrderDEs.mlx` posted on D2L to accomplish the following tasks.

   (a) Plot the direction field for the first order differential equation

   $$\frac{dx}{dt} = -\frac{x}{t} + \frac{1}{t}\cos(t).$$

   (b) Plot and indicate the point $(t_0, x_0) = (1, 2)$ on the same figure as the direction field for $\frac{dx}{dt} = -\frac{x}{t} + \frac{1}{t}\cos(t)$.

   (c) Use the function `ode45` to obtain a numerical solution to the initial value problem

   $$\begin{aligned} \frac{dx}{dt} &= -\frac{x}{t} + \frac{1}{t}\cos(t), \\ x(1) &= 2. \end{aligned}$$

   (d) Plot the numerical solution obtained in part (c) on the same figure as the direction field for $\frac{dx}{dt} = -\frac{x}{t} + \frac{1}{t}\cos(t)$. Also indicate the point $(1, 2)$ corresponding to the initial condition on this figure.

   Make sure to incorporate a title and text in the live script that explains what you problem you are solving and what the corresponding code does.