1. Recall that the Taylor series for \( \sin(x) \) is 
\[
\sum (-1)^n \frac{x^{2n+1}}{(2n+1)!}.
\]
Find the Taylor series for \( \text{Si}(x) = \int_0^x \frac{\sin(t)}{t} \, dt \).

(3 points)

2. Suppose that we know that \( \frac{dy}{dx} = f(y) \) for some function \( f(y) \). Also suppose that we approximate the solution to this differential equation, with initial condition \( y(0) = 0 \), with Euler’s method and \( \Delta x = 0.5 \).
If we find \( y(0.5) \approx 1 \), \( y(1) \approx 1.5 \), \( y(1.5) \approx 1.75 \), and \( y(2) \approx 1.875 \),

(4 points)

a. What is \( \frac{dy}{dx} \) at \( y = 0 \), \( y = 0.5 \), and \( y = 1 \)?

b. Give a rough sketch of the slope field of this differential equation.

3. Find all solutions to the differential equation \( \frac{1}{t} \frac{dp}{dt} + p = 2 \).

(3 points)