Worksheet 2/20/2025

1. Consider the initial-value problem $y' = x + y^2$, $y(-1) = 0$. Use Euler's method to estimate $y(-0.9)$, $y(-0.8)$, $y(-0.7)$, $y(-0.6)$, $y(-0.5)$.

2. Use Euler's method with step size 0.1 to estimate $y(0.5)$, where $y(x)$ is the solution of the initial-value problem $y' = y + xy$, $y(0) = 1$.

3. Sketch the direction field of the differential equation $y' = y - x$ at the points $(a, b) \in \left\{0, \pm\frac{1}{2}, \pm 1\right\}$.

4. Choose the differential equation whose direction field is given below.

A. $y' = y\sin(\pi x)$

B. $y' = y\cos(\pi x)$

C. $y' = \cos(\pi y)$

D. $y' = x\cos(\pi y)$