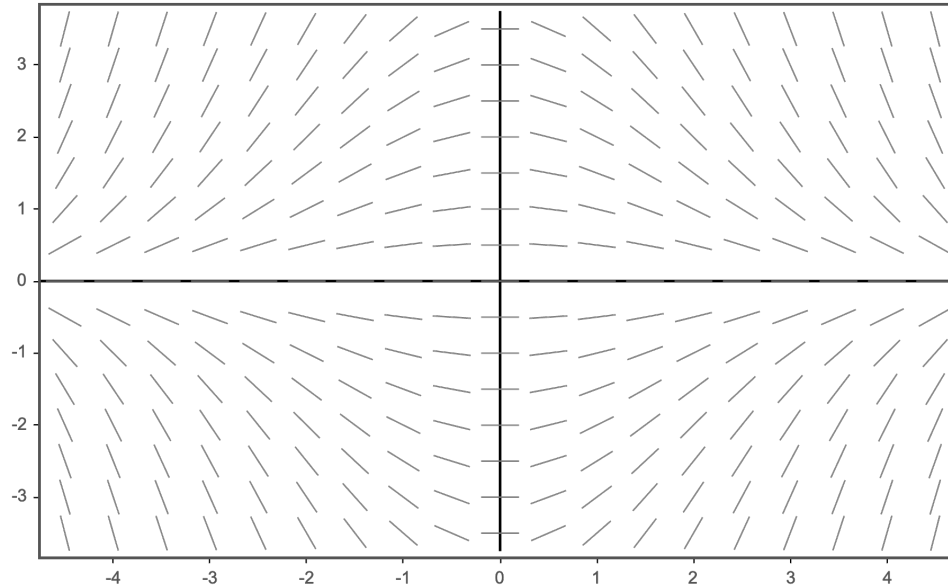# MAT 137 (Calculus II) Prof. Swift

Introduction to Differential Equations

1. Verify that $y = 3e^{x^2}$ is a solution to the Initial Value Problem $\frac{dy}{dx} = 2xy$, $y(0) = 3$.

2. Verify that the function $y = c_1 e^x + c_2 e^{-x}$ is a solution to the Ordinary Differential Equation (ODE) $\frac{d^2 y}{dx^2} = y$, also written as $y'' = y$, for any values of the constants c_1 and c_2. Find the solution to the ODE that satisfies the initial conditions $y(0) = 0$, $y'(0) = 2$.

3. The following figure is the slope field for some ODE $y' = f(x, y)$. Sketch two solutions to the ODE: One that satisfies the initial condition $y(0) = 3$, and another that satisfies the initial condition $y(0) = -2$.