

1. Show that $y(t) = \ln(t + C)$ is a one-parameter family of solutions of the differential equation

$$\frac{dy}{dt} = e^{-y}.$$

Then find the solution satisfying the initial condition

$$y(0) = 0.$$

2. **By hand**, sketch the direction field for the ODE

$$\frac{dy}{dt} = y \left(1 - \frac{y}{4} \right)$$

with the axes showing the region $0 \leq t \leq 8$ and $0 \leq y \leq 8$.

Find all solutions of the differential equation of the form $y(t) = c$ where c is a constant. Sketch these solutions on your direction field.