Name: _____Tyeon Ford_____

**LT7:** I can check whether a function is a solution to a differential equation and explain why the function is or is not a solution.

1. Verify that the family of functions $y(x) = Ce^x - x - 1$, where $C$ is a constant, are solutions to the differential equation $\frac{dy}{dx} = x + y$.

$$\frac{dy}{dx} = x + y \qquad y(x) = Ce^x - x - 1$$

$y(x) = Ce^x - x - 1$
is a solution.

$$\frac{dy}{dx} = x + (Ce - 2x - 1) \qquad \begin{array}{c} x + y = Ce^x - x - 1 \\ -x \qquad\qquad -x \\ \hline \end{array}$$

$$\boxed{Ce - X - 1 = Ce^x - X - 1} \qquad y = Ce^x - 2x - 1$$

**LT8:** I can use slope fields to obtain qualitative information about the solutions to a differential equation. I can identify stable and unstable equilibria of an autonomous differential equation.

1. Consider the differential equation

$$\frac{dy}{dt} = y(y-2).$$

(a) Sketch a slope field for this differential equation. Label your $y$-axis with $y = -1, 0, 1, 2,$ and $3$.

| $y$ | $\frac{dy}{dt}$ |
|-----|------|
| $-1$ | $3$ ↗ |
| $0$ | $0$ → |
| $1$ | $-1$ ↘ |
| $2$ | $0$ → |
| $3$ | $3$ ↗ |
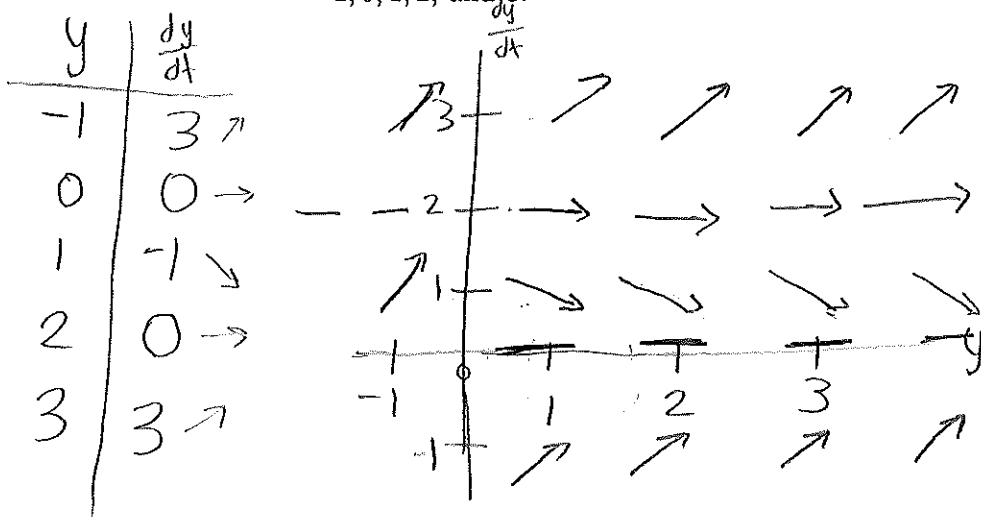


(b) Identify any equilibrium solutions and classify each as STABLE or UNSTABLE.

$$y = 0 \rightarrow stable$$

$$y = 2 \rightarrow Unstable$$