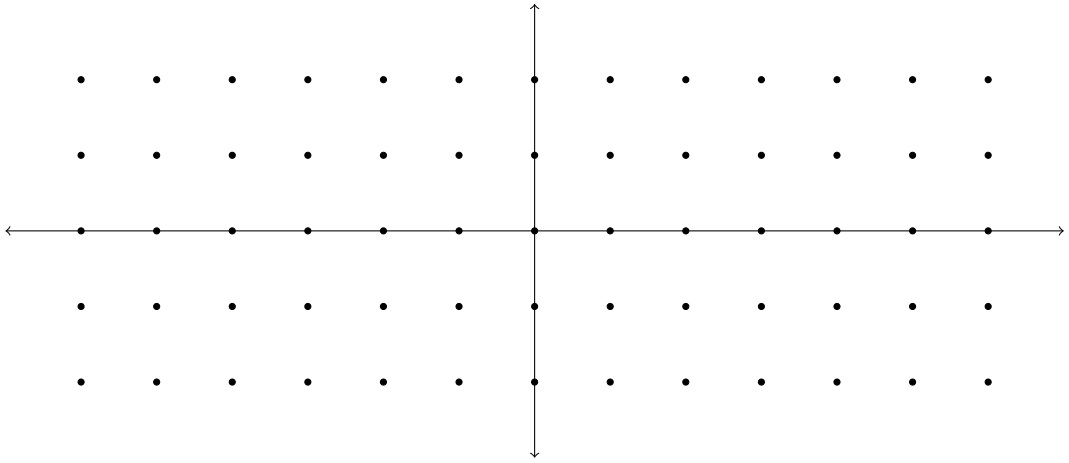
Name: _____
Worksheet 1 – Week 3

1. [ ] Find the slope of $y(t)$ given by $\dfrac{dy}{dt} = 6y - 3$ at the point $(2, 0)$.

2. [ ] Find the slope of $y(t)$ given by $\dfrac{dy}{dt} = (t^2 - 1)y + 3t$ at the point $(3, -1)$.

3. Draw the slope field of $\dfrac{dy}{dt} = -y + 1$.



4. [ ] Write what it means for $y(t)$ to be asymptotic to $u(t)$.

5. Find a differential equation such that all solutions $y(t)$ satisfy $y(t) \to 3$ as $t \to \infty$.

[ ]

6. Find a differential equation such that all solutions $y(t)$ are asymptotic to $t^3 + 2$.

[ ]

7. Solve the initial value problem $\dfrac{dy}{dt} = 13y + 65$, $y(0) = 2$.

8. State the order of and either "linear" or "nonlinear" for $t\dfrac{d^3y}{dt^3}y + t^3y = \sinh(t^4 - 16)$.

9. State the order and linearity $y^2\dfrac{\partial^3 z(x,y)}{\partial x^2 \partial y} + x^3 z(x,y) = \sinh(x^4 - 16)$.

10. Determine the values of r for which $t^2\dfrac{d^2y}{dt^2} - 4t\dfrac{dy}{dt} + 4y = 0$ has a solution of the form $y(t) = t^r$, $t > 0$.

11. Solve the initial value problem $\dfrac{dy}{dt} + \cot(t)y = 2e^t$, $y(\pi/2) = 5)$, $t \in (0, \pi)$.

12. Determine whether the function $f(x, y) = 2x^2 - 3y^2 + 4xy$ is homogeneous. If so, state the order.