

Problem Set for Monday Differential Equations

Do: 31.1 #1 and 31.2 #16, 18 - where line 2 should say $kP - E$.

plus

1. For each differential equation below:

- (i) Find the set of all points in the ty -plane such that $\frac{dy}{dt} = 0$.
- (ii) Find the set of all points in the ty -plane such that $\frac{dy}{dt}$ is positive.
- (iii) Find the set of all points in the ty -plane such that $\frac{dy}{dt}$ is negative.
- (iv) Find the family of solutions. Give a formula for the analytic solution. Then graph some representative solutions. Your graphs should agree with your answers to (i)-(iii).
- (v) Find the solution corresponding to the initial condition $y(0) = 1$

(a) $\frac{dy}{dt} = -y$ (b) $\frac{dy}{dt} = -t$ (c) $\frac{dy}{dt} = y - 2$ (d) $\frac{dy}{dt} = t - 2$ (e) $\frac{dy}{dt} = t^2$

2. Match the differential equation with the slope field. Explain your reasoning.

- (a) $\frac{dy}{dt} = 2y - t$ (b) $\frac{dy}{dt} = y^2 - 1$ (c) $\frac{dy}{dt} = 1 - y$ (d) $\frac{dy}{dt} = e^{-t^2}$
 (e) $\frac{dy}{dt} = \frac{1}{t}$ (f) $\frac{dy}{dt} = \frac{1}{y}$ (g) $\frac{dy}{dt} = \frac{-t}{y}$

