

HOMEWORK 6
DIFFERENTIAL EQUATIONS
DUE 09-05

Show your work!

- (1) Consider the differential equation $\dot{y} = \frac{1}{1-y}$.
 - (a) Use separation of variables to find an implicit solution to the above equation in the form $ay^2 + by + f(t) = 0$. (The constant C will be part of your function $f(t)$.)
 - (b) Use the quadratic formula to find an explicit formula for y in terms of t .
 - (c) If $y(0) = -4$, then what is $y(8)$?
- (2) Consider the differential equation $\dot{y} = y^2$.
 - (a) Find the solution with $y(0) = 3$.
 - (b) Find the solution with $y(0) = 0$. (WARNING: This one is a little tricky.)
- (3) Consider the logistic model $\dot{P} = kP\left(1 - \frac{P}{N}\right)$ for a population of fish, where $k = 0.3 \frac{1}{\text{year}}$ and $N = 2500$ fish. **Show your work**; you may *not* just use the formula from class.
 - (a) Suppose that there are initially 50 fish. How many fish are there after 30 years?
 - (b) Suppose that there are initially 2500 fish. How many fish are there after 30 years?
- (4) **Two** book problems: #1.2.21, 35.