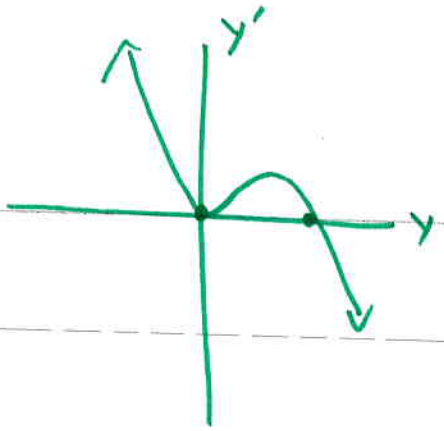
Name KEY

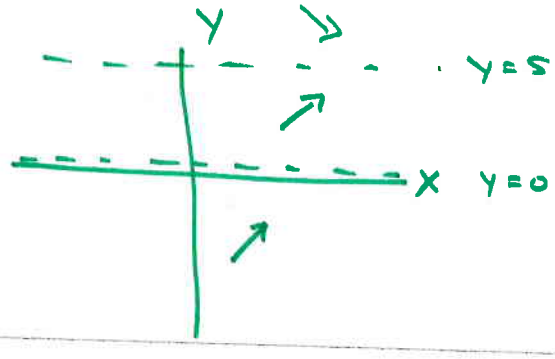
Math 255, Quiz #2, Summer 2012

Instructions: Show all work. Use exact answers unless the problem specifically asks you to approximate or begins with decimal values.

1. Sketch the direction field and phase plane for the autonomous differential equation $\frac{dy}{dx} = y^2(5-y)$. Clearly label any equilibria, and determine if they are stable, unstable or semi-stable.

$y' = 5y^2 - y^3$





$y = 5$ stable

$y = 0$ semi-stable

2. Solve the separable differential equation $x\frac{dy}{dx} = ylnx$ for the general solution.

$$\int \frac{dy}{y} = \int \frac{\ln x}{x}\,dx$$

$u = \ln x$

$du = \frac{1}{x}dx$

$\int u\,du$

$$\ln y = \frac{\ln^2 x}{2} + C$$