

Math 31L Lab Quiz #3

Blake Fall 1998

Name: _____

1. (22 points) Consider the differential equations below, with the indicated initial conditions.

$$\frac{dy}{dt} = -2y + 5w ; \quad \frac{dw}{dt} = 2y - 5w; \quad y(0) = 8 \text{ and } w(0) = 13.$$

- (a) Show that $y(t) + w(t)$ must be constant. Find the constant.

- (b) Find $y(t)$. Be sure to show all of your work. Unsupported answers will receive no credit.

(c) Find $w(t)$.

2. (8 points) Here is the same system of differential equations as in problem 1:

$$\frac{dy}{dt} = -2y + 5w ; \quad \frac{dw}{dt} = 2y - 5w$$

$$y(0) = 8 \text{ and } w(0) = 13.$$

(a) Eventually, $y(t)$ and $w(t)$ approach equilibrium. Show how you can find the equilibrium values without solving the differential equations for $y(t)$ and $w(t)$.

(b) Now use your solutions for $y(t)$ and $w(t)$ from part 1 to find the equilibrium values of $y(t)$ and $w(t)$.