

Name _____
Student I.D. _____

Math 2250-4
Quiz 3
January 24, 2013

1) Consider the following differential equation for a function $x(t)$, which could be modeling a logistic population:

$$x'(t) = 3x - x^2.$$

1a) Draw the phase diagram. Identify the equilibrium solutions and whether or not they are stable.

(3 points)

1b) Solve the initial value problem for the differential equation above, with $x(0) = 1$:

$$x'(t) = 3x - x^2.$$
$$x(0) = 1.$$

Hint: To save time with partial fractions on this very brief quiz you may use the identity

$$\frac{1}{x(x-3)} = \frac{1}{3} \left(\frac{1}{x-3} - \frac{1}{x} \right).$$

(6 points)

1c) For your solution $x(t)$ to (b), verify that $\lim_{t \rightarrow \infty} x(t)$ does agree with the value implied by your phase diagram in part (a).

(1 point)