

Quiz 11

Name: _____

Key

You must show your work to get full credit.

A population of algae in a tank grows by

$$N_{t+1} = .2N_t e^{.5N_t(3.95-N_t)}$$

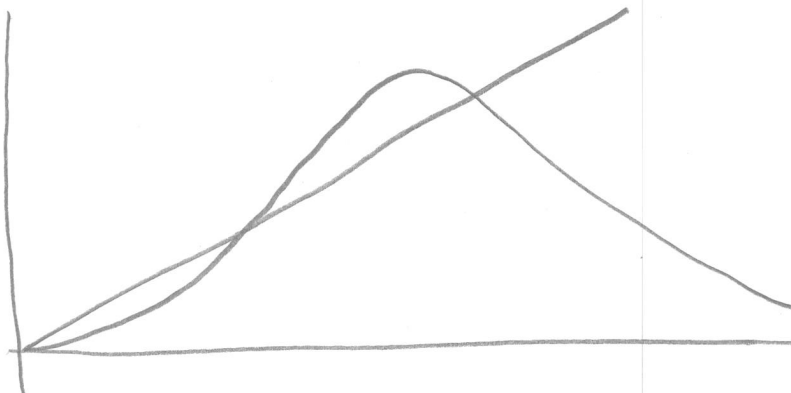
where N_t is the grams of algae t days after we start observations. We wish to analyze this model by use of our calculators.

(1) What two functions do we want for $\setminus Y_1 =$ and $\setminus Y_2 = ?$

$$\setminus Y_1 = .2X e^{(.5X(3.95-X))}$$

$$\setminus Y_2 = X$$

(2) Plot these functions on the interval $0 \leq x \leq 4$ and make a sketch of the graph here.



(3) What are the equilibrium points? Write a sentence or two saying how you found them.

$N_t = 0$ is clear from picture.

Equilibrium points are: 0, 1.1993, 2.8007

For the other 2 I used the 2nd calc intersect function on the calculator

(4) Which of the equilibrium points are stable? Explain how you determined if they were stable.

The stable equilibrium points are: $N_t = 0$

At $N_t = 0$, $|dy/dx| = 1.21 < 1$ so stable

At $N_t = 1.1993$, $|dy/dx| = |1.0948| > 1$ unstable

At $N_t = 2.8007$, $|dy/dx| = |-1.3129| > 1$ unstable