Mathematics 172

Quiz #11 Name: Key

You must show your work to get full credit.

Let $A(t)$ be the number of grams of bacterium in a nutrient solution. Assume that this population grows logistical with an intrinsic growth rate of $r = .12$ grams/day and a carrying capacity of 3 grams.

1. Write the rate eqaution for $A(t)$. (Recall that a rate equation is an equation (so there is equal sign in it) and that it will involve the rate $A'(t) = \frac{dA}{dt}$.)

$$\frac{dA}{dt} = .12A\left(1 - \frac{A}{3}\right)$$

Some paramecium are introduced into the nutrient and they eat the bacterium at a constant rate of 0.03 grams/day.

2. Write down the new rate equation that takes into accout the paramecium.

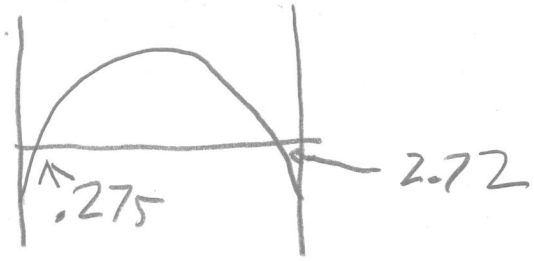
$$\frac{dA}{dt} = .12A\left(1 - \frac{A}{3}\right) - .03$$

3. Use your calculator to find the equilibrium points of the equation of Problem 2.

$Y_1 = .12X(1 - X/3) - .03$

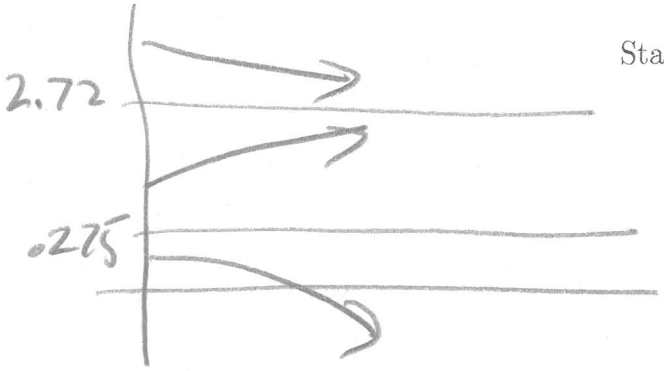
$X_{min} = 0$

$X_{max} = 3$



Equilibrium points .275, 2.72

4. Which of these equilibrium points is stable?



Stable points are: 2.72