

Quiz #9

Name: Key

You must show your work to get full credit.

Consider the discrete logistic equation with per capita growth rate $R = 3.0$ and capacity $K = 400$.

1 pt (1) Write out the system (that an equation of the form $N_{t+1} = \dots$)

OR.

$$N_{t+1} = N_t + 3 \cdot N_t \left(1 - \frac{N_t}{400}\right)$$

$$N_{t+1} = N_t \left(1 + 3 - \frac{3N_t}{400}\right)$$

$$= N_t \left(4 - \frac{3N_t}{400}\right) = 4N_t \left(1 - \frac{3N_t}{1,600}\right)$$

any of these ok

(2) Find equilibrium point(s)

$$N_2 = 0, \quad N_1 = 400$$

solve

2 pt

$$N = N + 3N \left(1 - \frac{N}{400}\right)$$

$$0 = 3N \left(1 - \frac{N}{400}\right)$$

2 pt (3) Determine if the equilibrium point(s) are stable or unstable.

IF $f(N) = N + 3N \left(1 - \frac{N}{400}\right)$

Both $N=0$
and $N=400$
are unstable

$$f'(0) = 4 \quad |4| > 1$$

$$f'(400) = -20 \quad |-20| > 1$$