

Answers: Problem Set 3, October 2009

1. $x(t + 1) = 2 x(t) [1 - x(t)]$

Equilibrium: $x(t) = x(t + 1) = x^*$

$x^* = 2 x^* (1 - x^*)$, implying $1 = 2 (1 - x^*)$

$1 = 2 - 2x^*$, implying $2x^* = 2 - 1$; Hence $x^* = 1/2$

Apply same approach to Problem 2.

3. $N(t+1) = N(t) \exp [r (1 - N(t)/K)]$

Equilibrium: $N(t) = N(t + 1) = n$

$n = n \exp[r (1 - n/K)]$

$1 = \exp[r(1 - n/K)]$; Take log: $0 = r(1 - n/K)$

Since $r > 0$, $0 = 1 - n/K$; Hence $n = K$

4. Given:

$$b_0 := 0.5 \quad b_1 := \frac{8}{5} \quad b_2 := 1.6$$

$$l_0 := \frac{560}{560} \quad \frac{560}{560} = 1 \quad l_1 := \frac{350}{560} \quad \frac{350}{560} = 0.625$$

$$l_2 := \frac{70}{560} \quad \frac{70}{560} = 0.125 \quad l_3 := 0$$

$$R_0 := l_0 \cdot b_0 + l_1 \cdot b_1 + l_2 \cdot b_2 \quad R_0 = 1.7$$

$$G := \frac{l_0 \cdot b_0^0 + l_1 \cdot b_1^1 + l_2 \cdot b_2^2}{R_0} \quad G = 0.824$$