

Homework 2

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1. Consider this fantastical recursion equation $n_{t+1} = \left(\frac{\gamma + \alpha}{2\gamma} - \mu \right) n_t$.
 - What is R_0 for this model?
 - When will this population grow?
2. In lecture we looked at a model where $n_{t+1} = n_t (1-d) (1+b)$.
 - What is R_0 in this model?
 - Write out values of n_1 , n_2 , and n_3 .
 - What is the general formula for $n(t)$?
 - If $d = 1/2$ what value does b need to have in order for $R_0 > 1$?
3. We have an equation to determine the probability of extinction when a single individual is introduced:
 $E_1 = d + (1-d) (1-b) E_1 + (1-d) b E_2$
 - What do E_1 and E_2 represent?
 - We then assumed that $E_2 = E_1^2$. How was that assumption justified?
 - We found that $E_1 = \frac{d}{b(1-d)}$. Show that $E_1 < 1$ if $R_0 > 1$ (Use the model in question 2).