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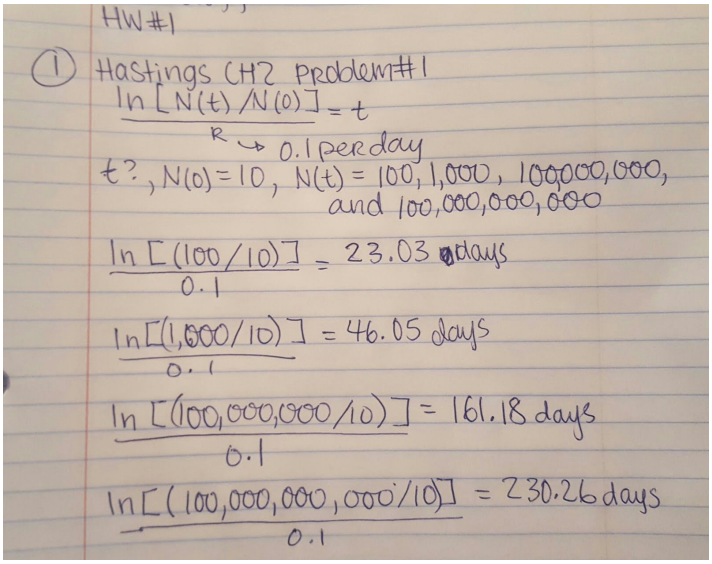
BI 471: Population Ecology

Spring 2016

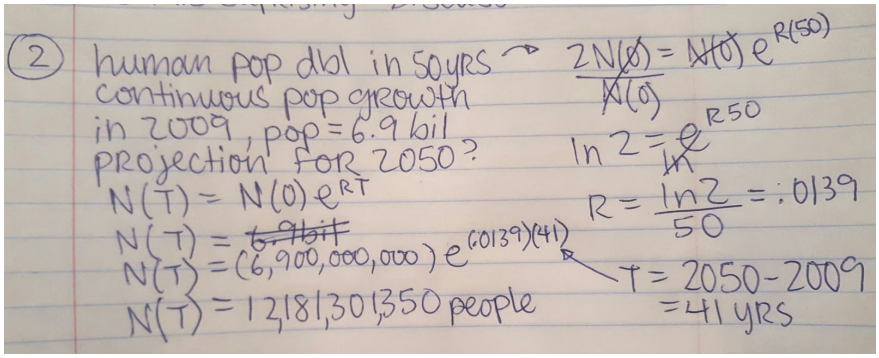
Homework 1: Single species dynamics

1. The lice reach a population size of a hundred in about 23 days, a thousand in 46 days, a hundred million in 161 days, and a hundred trillion in 230 days. This doesn't surprise me due to its exponential growth rate. Lice are quick at reproducing and this can be seen clearly in the calculations I have provided in the figure on the right.

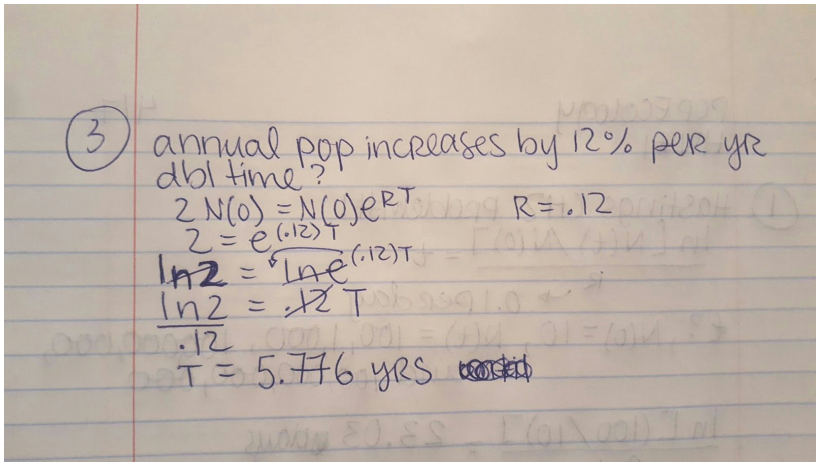


2. The population is projected to be about 12 billion in the year 2050. See figure on right.

3. The doubling time is about 5.776 years. See figure on right.



4. I think that Eugene is not significantly density-independent because of its type of citizens. There are a lot of young college-aged students that change the population of the city throughout the year. As for density dependence, three mechanisms that could introduce it could be disease, drought, and natural disasters.



5. I choose to focus on agave. The agave plant is often called a "century plant" because it only flowers once in its lifetime. This is a bit of a misnomer due to its lifespan

lasting from 10 to 30 years and its bloom occurring around 12 years in age. This semelparous plant dies after it flowers, but may continue growth through shoots at its base. The population dynamics of this plant show that it should be modeled using a discrete framework. Due to its very slow reproductive cycle and its semelparity, the agave would be best described using a discrete framework. A continuous model would not work well because these plants only flower once in their life and expire following this act.

6. Code:

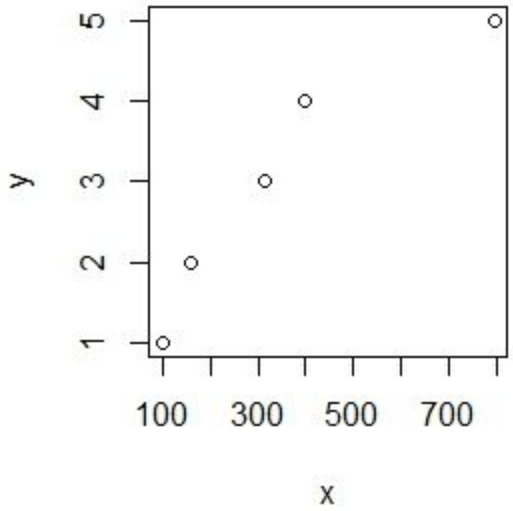
```
times <- 1:5

N <- log(c(100, 158, 315, 398, 794))

x <- c(100, 158, 315, 398, 794)

y <- 1:5

lm(y~x)$coefficients
```



Output:

(Intercept) x (r value)

1.084284495 0.005426956

Plot: X: population size, Y: time

The calculated value for are is 0.005426956.

7. I was very confused on this question and hope to have it explained in next week's class.