In general, for this class we don’t take off for grammar or spelling sorts of problems, nor does the assignment have to be printed or formatted in any particular way. Handwriting with graph paper is perfectly fine. However, it has to be legible and interpretable. So, for example, if the spelling or grammar is so bad that you cannot adequately evaluate an answer, then the answer should be marked wrong. Try to give explanations where possible, but remember you can’t spend too much time on each paper. However, whatever guidance you can give on this assignment will help the students to clean up later assignments.

The concepts of **population**, **population growth, and density dependent growth** are more difficult that they may first seem. To reinforce these ideas, we want you to find some “population” of your own your own choosing, define it clearly for us, and quantify some patterns of growth in this population.

We want you to make three graphs with your data, and then answer the questions below. The graphs are:



Then, answer the following questions:

(4 pts per graph = 12 pts) Make three graphs with your data. We suggest Excel for this, but any program or even doing it by hand is fine.

* Population Size vs. Time
* Population Growth Rate vs. Time
* Per-capita growth rate vs. Population Size

Each graph must have properly labeled axes (1 pt. for each axis), then the right information plotted inside (2 pts.). Some students may plot Population Growth Rate vs. Population Size for the second graph. Take off the 2 pts (5 pts.)

1. (5 pts) Define your population in words, sufficient so that someone else could find a similar population. Include a table showing us your raw data.

* Because we want to see growth, you need to start with some low number of individuals in your population.
* You need population sizes from at least 10 time intervals.
* Don’t use humans, as in the example. Be more creative.
* Do your own work! Each student needs his own population

The definition is for 3 pts,, including 1 pt each for the following bits of information. It needs to clearly describe what constitutes an individual in their population (cars, dogs, etc.), as well as defining a time and location (“dogs in Tom Brown Park on Tuesday afternoon between 3 and 7 pm”).

They get 2 pt. for including their data in a organized table. Don’t worry if they used humans. We can be very lenient here. But, they have to include the data and it has to have a minimum of 10 time intervals. The time intervals don’t have to be regular (we didn’t require this). Nor does the population have to grow.

.

(2) (4 pts.) Describe the pattern of growth through time and attempt to explain its causes (the graph of per-capita growth rate as a function of density might be very useful here). For example, does your population continue to grow during the entire time of your observations? Do you think it will continue to grow? Why or why not?

We are hoping for some sort of understanding of the first and third graphs, especially. Is there exponential growth or not, at least initially? Does the growth level off? Is the per-capita growth rate slowing down? Why or why not? Is there some sort of limit (e.g., carrying capacity). For example, one girl followed the number of cars in some big gas station. The number of cars seemed to increase up to about 25, then bounce around 22-28. So, I’d like her to realize that there wasn’t exponential growth and that there was a limit that was like a carrying capacity, created by the limited number of pumps. Further, growth slowed as the station approached being full, as drivers were less likely to pull into a station that is busy.

But, be very lenient here. I’d say, roughly, that there should be 2 pts. for generally describing the pattern and 2 pts. for discussing if there was or was not a limit and why.

(3) (4 pts.) Is there any indication that your population is self-limiting (density-dependent growth)? Explain your evidence for or against self-limitation.

All I want here is for them to say if they think there is (or is not) a “significant” negative relationship in the third graph – they get the 4 pts! I have stated in lecture several times that this is the key test of DD. It has to be that graph. If they answer that the per capita growth rate does not show a pattern, but do not reference the relationship with density or pop size take off 2 pts. The fact that there is an apparent K is not sufficient evidence of DD – just give 1 pt for such answers.