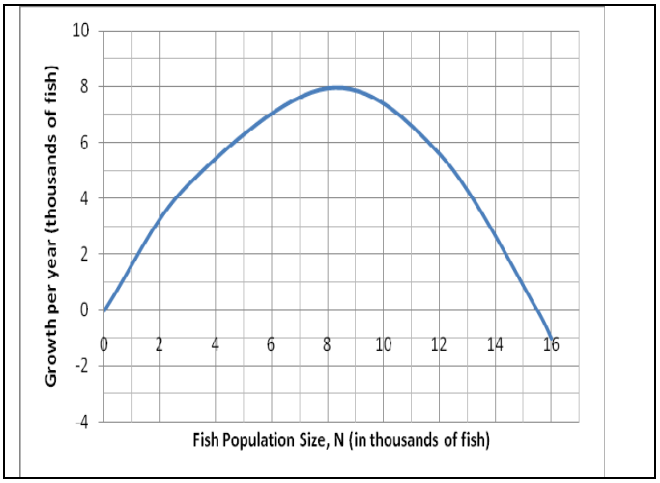
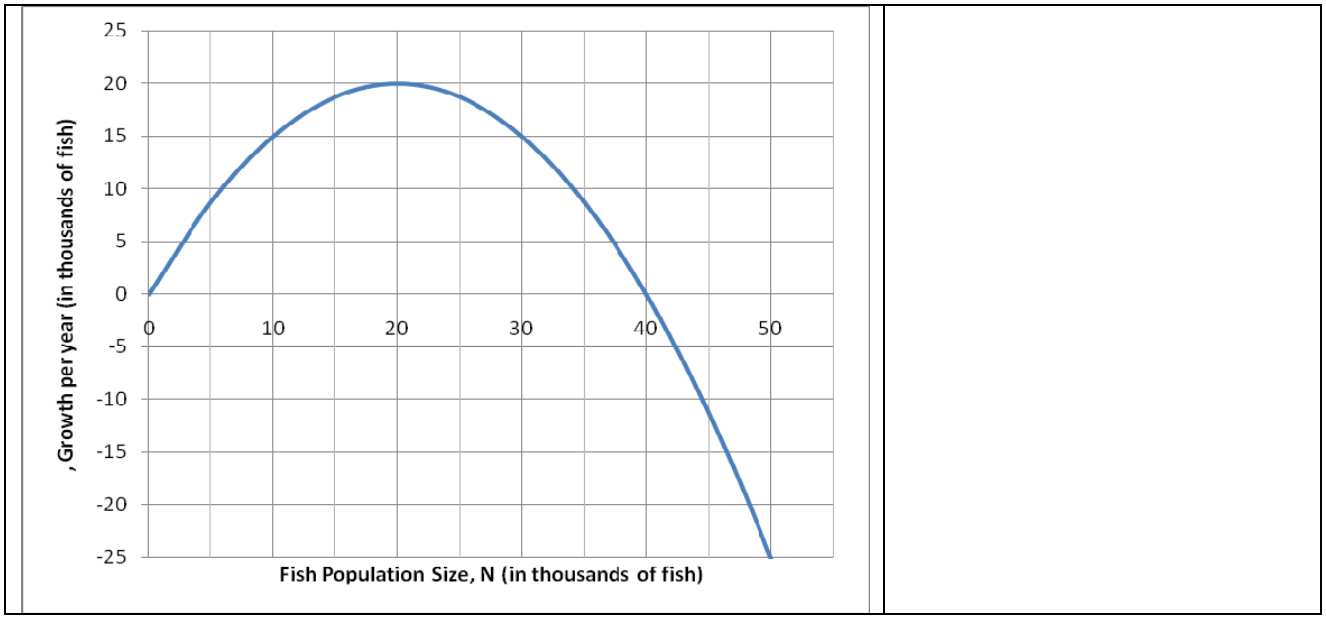
Day 23 MATD 0385 Wed. April 14 Review and Systems, Lesson 8 Activity 2 (We skipped Lesson 7)

More review of Exponential Growth. From Day 22 handout: 7, 10, 11, 12, 13.

Go over Quiz (Lesson 8, pages 70-73 Activity 1, all parts.) Here is the graph for number 2.



Do Activity 2, pages 74-75. Use this copy of the graph.



Class activity: pages 76-79

1. Compare the values given in the table to the graph you used in Activity 1. Notice that this is the table that gives that graph. It is also the same graph as in Figure 22 on these pages.

2. Why do we care about percent growth?
   Suppose your Friend A says, "My income last month was $100 more than the previous month."
   Suppose your Friend B also says, "My income last month was $100 more than the previous month."
   Suppose also that Friend A made $1000 in the previous month and Friend B made $4000 in the previous month. Do you suppose that additional $100 meant more to one of them than the other?

Is there some measure that would help you summarize this? Think about percent growth.

3. How did you compute percent growth? Look at page 76, and look at the line where the population size is 5. So the fish population increased A LOT in that year. Do you see what I mean? Compute the percent growth. (Answer: ratio is 1.75, so it is 175% growth.)

4. Fill in the remaining cells in the table.

5. Answer questions 1 and 2.

6. Look at question 3. Can you see that it is just like the Activity 2 we did? This problem will be assigned for the quiz and I will give you two starting values to use. **Notice that you can do this EITHER with the graph or with the table.**

7. Answer questions 4-7.

8. Read question 8 and answer it.

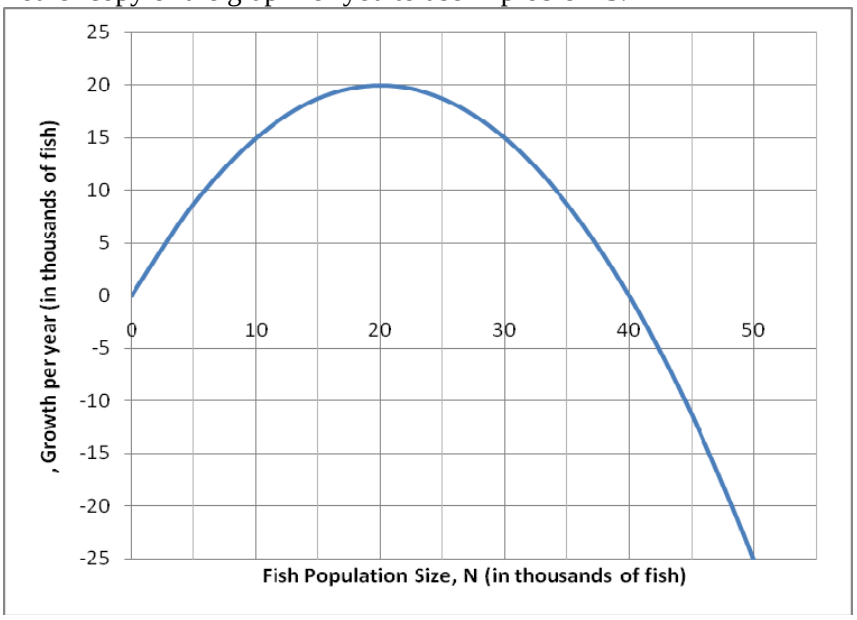
Homework: No additional homework.

Quiz. Lesson 8, page 77. Two problems, revised from what the book says.

Problem 3. For a, start with a fish population size of 5 thousand. For f, start with a fish population size of 30 thousand. So in this whole problem, you will do it twice – once with each of these starting values.

Problem 8. Instead of doing it as stated, start with a fish population size of 30,000 and then do the rest as stated.

Here's another copy of the graph for you to use in problem 3.



Answers:

Activity 2, pages 74-75.

1. 18,000. 2. 33,000 3. 33,000 – (0.10)*33,000 = 33,000 – 3,300 = 29,700
4. So when the pop'n is 29,700, the graph shows a growth of about 16,000.
5. 29,700 + 16000 = 45,700. Then 45,700 – (0.10)*45,700 = 45,700 – 4570 = 41,100
6. The population hovers around 40,000 fish.
7. The carrying capacity is the largest population that the lake will support. (In more general terms, it wouldn't have to be a lake – it could be any habitat that we're talking about.)

Homework, pages 76-79.

1. In the table, the last column has : undefined, 175%, 150%, 125%, 100%, 75%, 50%, 25%, 0%, -25%, -50%.
    a. The maximum growth occurs at N = 20, when the growth is 20 thousand. This isn't the highest percentage growth, but is the highest amount of growth.
    b. When the fishery becomes more crowded with fish, the amount of food per fish becomes smaller. This results in a smaller percent growth in the fish population size.
    c. Negative growth indicates that the population declines.
2. See the answers in the back.
3. If you start at N=25,
    a. Then the annual growth for the first year is 18, and then at the end of the first year we have 25+18 – (0.10)*(25+18) = 38.7 thousand fish.
    b. 38.7+2.5 – (0.10)*(38.7+2.5) = 41.2 – 4.1 = 37.1 thousand fish.
    c. Yes, we reach about 38 thousand fish
4. Deaths will exceed births per year; percent growth will be negative.
5. Percent growths have the largest possible values.
6. When the population numbers are low, then the growth starts low, but the growth increases pretty fast, causing the population numbers to increase. When the population number is at the maximum biological growth, then the amount of growth starts decreasing, so the population number doesn't go up as fast. When we reach the carrying capacity, then the population growth starts getting negative, which means the population size decreases.

7. When there are a few fish and lots of food, the fish are healthy and fertile and so the population size increases. As the population size gets larger, there is not as much food per fish. For awhile there is still enough food per fish, but then the population gets so large that there is not enough food per fish and the fish begin to be less healthy, less fertile, and eventually some will perish for lack of food. This means that they won't be reproducing nearly as much so between the dying off and the slower reproduction, the amount of growth decreases.
   As a side note: If a natural disaster occurs, the recovery from it will be faster if those who survive are healthy and fertile. So if the population is maintained at somewhat below the carrying capacity, they will recover faster from a natural disaster.

8. a. 7000 b. 8000 c. about $9.20