

Lab 01: Some Functions that aren't Linear

Calculus I

16 September 2024, College of the Atlantic

- Please work in groups of two or three.
- Please write your answers on this sheet, make a scan of it as a pdf, and upload it google classroom at the end of lab. Use “genius scan” or some similar scanning app. This assignment is not graded!

Names: _____

x	$f(x)$
1	2
2	4
3	8
4	16
5	32

1. A table of values for a function is shown above.
 - (a) How can you tell¹ that the function is not linear?
 - (b) What is $f(6)$? What is $f(0)$?
 - (c) Write down a formula for the function.
 - (d) What is the name of this type of function?

x	$f(x)$
1	12.432
2	17.405
3	24.367
4	34.113
5	47.759

2. The table of values for another function is shown above.
 - (a) What type of function is this? How can you tell?
 - (b) What is $g(6)$? What is $g(0)$? What is $g(20)$?
 - (c) Write down the formula for this function.

¹Aside from the fact that the name of this the lab is “functions that are not linear”.



Figure 1: Tofu on fire. Image source: <https://emojis.sh/emoji/tofu-in-pot-on-fire-P9jXnwz>.

Time	Pollution
1	32,400
2	19,440
3	11,664
5	4,199

3. The above table shows amount of smoke particles in the air in a building. Time is measured in hours since a pan of tofu stir-fry caught on fire, and pollution is measured in ppm (parts per million). The smoke decreases due to the building's air filters.
- (a) What type of function is this? How can you tell?
 - (b) What was the pollution level immediately after the tofu fire?
 - (c) Determine an equation describing this data.
 - (d) Explain the meaning of every symbol in the equation.
 - (e) What was the pollution level 15 minutes after the tofu fire?
 - (f) By what percent does the smoke level change each hour?
 - (g) Use your equation to predict the pollution level one day after the tofu incident.
 - (h) Why do you think the smoke level changes in this way?

4. Imagine you are writing a Field Guide of Mathematical Functions. What are the “field markings” – i.e., useful identifying characteristics – for exponential functions? (Don’t forget to ponder exponential decay.)

(a) What do the graphs of an exponential functions look like?

(b) How can you tell if a function is exponential by looking at a table of values?

(c) What is the equation for an exponential function?

(d) If given a verbal description of a function, how can you tell if it’s exponential?

5. BTW, as you have surely guessed by now, you will be making your own Field Guide to Functions. It does not have to be a traditional field guide! Almost any format is fine. Have fun! Be creative, artistic, poetic, etc. Don’t worry about having a polished final product. We’ll talk in more detail about the field guide in next class and lab.

In the meantime, if there’s still time in the lab, spend a few minutes thinking about the following:

(a) What are some initial thoughts about what you might want to do with your field guide? What media do you want to work in? What structure(s) are you thinking of?

(b) Do you anticipate needing any supplies for your field guide? Paper, colored pencils, glitter, etc.? (If so, please let me know soon so I can be sure to have supplies on hand.)