

Figure 8.23. Trying Tables

Polynomial functions can appear to be difficult to discover from a table of values unless you know a cool pattern that emerges.

Part 1

Use repeated (finite) differences and see what happens.

1. This is a cubic polynomial function.

x	y
-2	15
-1	1
0	-1
1	-3
2	-17

How many times did you have to find a difference before the differences showed a constant change?

2. This is a quadratic polynomial function.

x	y
-2	2
-1	-2
0	-4
1	-4
2	-2

How many times did you have to find a difference before the differences showed a constant change?

3. This is a fifth degree polynomial function.

x	y
-3	-311
-2	-47
-1	1
0	1
1	1
2	49
3	313
4	1201

How many times did you have to find a difference before the differences showed a constant change?

What can you conclude about the degree of a polynomial function and the number of times it takes to get to a constant difference?

This process is called either repeated difference or finite differences. Explain why both names would be appropriate.

Part 2

You have now discovered a pattern for determining if a table is a polynomial table or not. Decide if each of the following tables is a polynomial function or not. Explain how you know.

1.

x	y
-4	und.
-3	13
-2	6.5
-1	2.33
0	0.25

1 0.2
 2 2.1667
 3 6.1429
 4 20.111

2.

x	y
-3	-4.442
-2	3.26
-1	-2
0	0
1	2
2	3.26
3	4.44

Part 3

You can use repeated differences to find the value of functions as well.

1. Find as many repeated differences for the following cubic function as possible. Note that the table is drawn horizontally, so the differences will go down the page instead of to the right.

x	1.3	2.3	3.3	4.3	5.3	6.3
y	2.197	12.167	35.937	79.507		

Knowing that it is a cubic function, what should the values on the bottom row (third differences) be? Fill them in.

Next, use the values on the third row to fill in the values on the second row (second differences).

Repeat this process to find the first differences.

Finally, fill in the missing values in the table.

2. Use finite differences to find the missing values in the function table.

x	-3	-2	-1	0	1	2	3	4
y	18	-13	-10	-3	2			

Not everyone has completed this activity. Please explain:

1. How can you determine from a table of values if a function is a polynomial function or not, and if it is, the degree of the function.

2. How can using finite differences help find missing values in a function table, if the function is polynomial?

