Figure 8.24.

Polynomial or Not?

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

<u>Part 1</u>

Use repeated (finite) differences and see what happens.

1. This is a cubic polynomial function.

> Note: The x-values are changing constantly (by 1 in this table), so the process of finite differences will work

x	y			
–2	15			
		–14		
–1	1		___	
		–2		___
0	–1		___	
		–2		___
1	–3		___	
		–14		
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. Find the first and second differences.

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

Explain your conclusion:

2.

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

Explain your conclusion:

3.

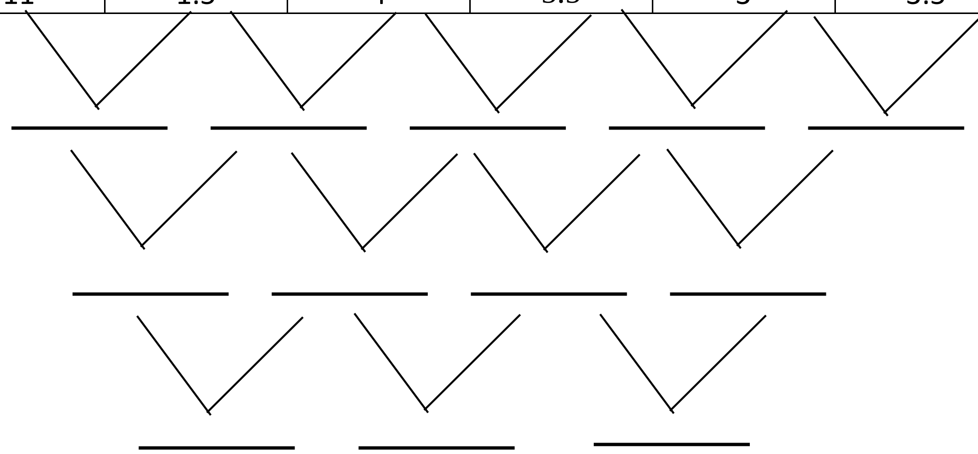
x	y
–4	137
–3	18
–2	–13
–1	–10
0	–3
1	2
2	23
3	102
4	305

Explain your conclusion:

You can also use a horizontal table and the same process.

4.

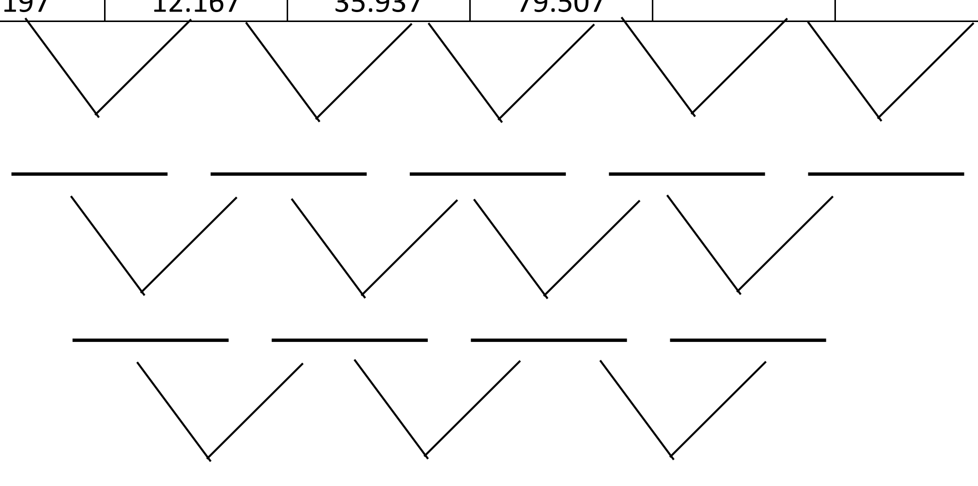
x	−2	1	0	1	2	3
y	-11	1.5	4	5.5	3	3.5



Explain your conclusion:

5.

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



Explain your conclusion: