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.

Part 1

Use repeated (finite) differences and see what happens.

1. This is a cubic polynomial function.

 x y

–14

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

–2 15

–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: