Lesson 3.3 Part 2

Linear and Non-Linear Functions

A linear function is a function that has a graph that is a line. If the domain of the function is all real numbers, then the function is continuous. A linear equation can be used to describe a linear function.

Linear equations are often written in standard form.

$y = mx + b$

Also linear

Standard Form: Ax + By = C

- A is positive
- A, B, and C have a GCF of 1
- No fractions or decimals

$\frac{2x}{2} + \frac{4y}{2} = \frac{6}{2}$

$x + 2y = 3$

Examples

$(2x)^2 \rightarrow (2x)(2x) \rightarrow 2 \cdot 2 \cdot x \cdot x$

1. Determine whether $y = 4x^2 - (2x)^2 + 3x - 5$ is a linear or nonlinear function.

$y = 4x^2 - 4x^2 + 3x - 5$

$y = 3x - 5$ ← Slope-Intercept Form

Linear

2. Determine whether $8 - 2y = x$ is a linear or nonlinear function.

$-8 \quad -8$

$\frac{-2y}{-2} = \frac{x - 8}{-2} \quad -2$

$y = \frac{1}{2}x + 4$

Linear

3. Determine whether $y = 3x^3 - x^2 + 3x + 6$ is a linear or nonlinear function.

not because exponents

4. Determine which of the equations below are linear or nonlinear

$4x(2 - y) = 9$

$8x - 4xy = 9$

Not

$-3y = 5 - 2x$

Linear

$y = \frac{3}{4}x - \frac{1}{3}$

Linear

Nope

$y = \sqrt{2x - 4}$

Linear

$y = 2x - \sqrt{4}$

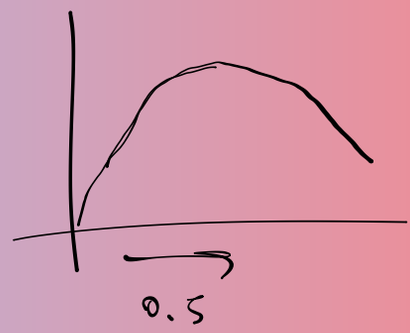
Functions in a Table

5. Salina kicks a soccer ball. The height of the ball after each half second is recorded in the table. Is the function that models the height of the ball a linear or nonlinear function?

Look for shape

Time (s)	Height (ft)
0	2
0.5	28
1	46
1.5	56
2	58
2.5	52
3	38
3.5	16

0.5



Not

6. Determine whether the values in each table are best modeled by a linear or nonlinear function.

x	y
−2	4
−1	1
0	0
1	1
2	4

Not

Check for slope

x	y	
−2	8	−9
1	−1	−3
2	−4	−9
5	−13	−6
7	−19	

$\frac{\Delta y}{\Delta x} = \frac{-9}{3} = \frac{-3}{1}$ $\quad \frac{-6}{2} = \frac{-3}{1}$

$\frac{-3}{1}$

Linear