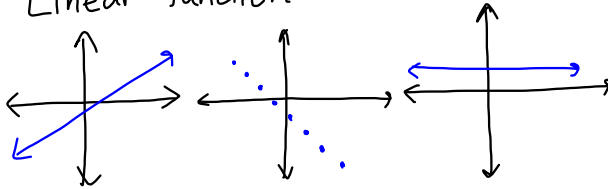


Sec. 4.3 Patterns and Nonlinear Functions

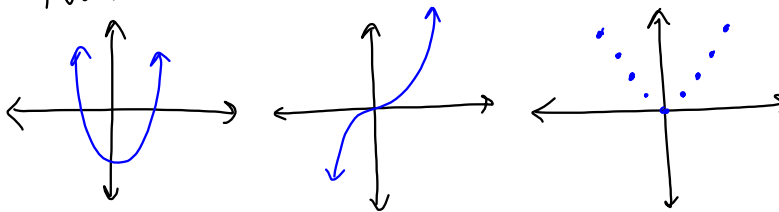
Vocabulary

nonlinear function: a function whose graph is not a line or part of a line

Linear function:



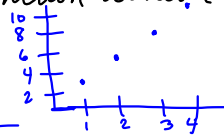
Nonlinear function



Problem 1: The number of centimeters is a function of the number of inches as shown in the table. Is the function linear or nonlinear?

Converting Inches to Centimeters

Inches	Centimeters	first differences
1	2.54	} same LINEAR (or graph the coordinates)
2	5.08	
3	7.62	
4	10.16	



Problem 2: The table shows the number of calls made in a phone tree during each level. Identify the pattern to complete the table. How can you represent the relationship using words, an equation, and a graph?

Level x	Number of Calls, y	Ordered Pair (x, y)
1	2	(1, 2)
2	4	(2, 4)
3	8	(3, 8)
4	16	(4, 16)
5	32	(5, 32)

$\cdot 2 = 2^1$
 $\cdot 2 \cdot 2 = 2^2$
 $\cdot 2 \cdot 2 \cdot 2 = 2^3$
 \vdots
 $\cdot 2 \cdot 2 \dots 2 = 2^x$

$y = 2^x$

The number of calls made at a level is equal to 2 raised to the level number.

Problem 3: The ordered pairs $(1, 1)$, $(2, 8)$, $(3, 27)$, $(4, 64)$, and $(5, 125)$ represent a function. What is a rule that represents this function?

x	y
1	1
2	8
3	27
4	64
5	125

$$y = x^3$$

$$2^2 = 4 \cdot 2 = 8$$

$$3^2 = 9 \cdot 3 = 27$$

$$4^2 = 16 \cdot 4 = 64$$

$$5^2 = 25 \cdot 5 = 125$$

$$1^3 = 1$$

$$2^3 = 8$$

$$3^3 = 27$$

$$4^3 = 64$$

$$5^3 = 125$$