Lesson 2: Identifying Properties of Linear Relations

Warm-Up: Skill question 2 on unit outline

First Differences

***How do we find out if a relation is going to be linear or not without graphing it? We can use something called "First Differences" to find out. ***

First Differences – Compares the y-values to see if a relation is linear or not.

Linear

Equation	First Differences	Observations
$y = 3x + 2$ $\begin{array}{c\|c} x & y \\ \hline -2 & \\ -1 & \\ 0 & \\ 1 & \\ 2 & \end{array}$		

Non-Linear

Equation	First Differences	Observations
$y = x^2 - 1$ $\begin{array}{c\|c} x & y \\ \hline -2 & \\ -1 & \\ 0 & \\ 1 & \\ 2 & \end{array}$		

First Differences

x	y	
-2	$y_1 = 4$	
-1	$y_2 = 7$	$y_2 - y_1 =$
0	$y_3 = 10$	$y_3 - y_2 =$
1	$y_4 = 13$	$y_4 - y_3 =$
2	$y_5 = 16$	$y_5 - y_4 =$

Observations:

1. If the first differences are the same, the relation is _____.

2. If the first differences are not the same, the relation is _____.

Examples:
Determine whether the following are linear or non-linear:

x	y
-2	3
-1	4
0	0
1	-2

x	y
-5	7
-4	4
-3	1
-2	-2

x	y
0	-10
1	-8
2	-7
3	-4
4	0

x	y
4	1
3	-3
6	9
5	5
2	-7

Homework: p.145-146 #1, 2, 5, 6