**HN Math III Analyzing Average Rates of Change**

**Unit 3, Day 7 Notes & Polynomial Applications**

1. **Analyzing Average Rates of Change**

Quick Refresher: Slopes of Linear Functions SLOPE =



The **average rate of change** of a function that is non-linear will not be constant. It can be positive or negative, whole number or fraction.

**Ex 1:** Consider the parabola shown at the right.

1. To find the average rate of change between x = 1 and x = 2, you need to locate the ordered pairs that correspond to those points on the graph.

1. Draw a line connecting the two points.
2. Calculate the average rate of change. This will give us an estimate of how the quadratic is changing between those two points.
3. Now repeat the process to find the average rate of change between x = 4 and x = 6.
4. What do you notice about the average rate of change between x =1 and x = 2 compared to the average rate of change between x = 4 and x = 6?
5. How would you have been able to predict this answer from the given graph?
6. What do you predict would be true about the average rate of change between x = 3 and x = 4?

**Ex 2:** Given *f(x)* = $x^{2}-5x$ and *g(x)* = $3(2)^{x}$

Create a table of values for each function.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *x* | 0 | 1 | 2 | 3 | 4 | 5 |
| *f(x)* |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *X* | 0 | 1 | 2 | 3 | 4 | 5 |
| *g(x)* |  |  |  |  |  |  |

a) Find the average rate of change from x = 0 to x = 1 for each function.

b) Find the average rate of change from x = 4 to x = 5 for each function.

c) What observations can you make about each table that support the answers you found in parts a and b?

1. **Polynomial Applications**

**Ex 1:** The volume of a swimming pool is given to be $3x^{3}-4x^{2}-28x-16.$ If the height of the pool is given to be $x-4$, what are the dimensions of the rectangular base of the pool?

**Ex 2:** You are hired by a cosmetics company to solve this problem: They need a storage box that has twice the volume of their largest box.  Its largest box measures 5 inches by 4 inches by 3 inches. The larger box needs to be made larger by adding the same amount (an integer) to each to each dimension. Find the increase to each dimension.