Math 250 – Notes: Sect. 4.2/4.6 – Sigma Notation and AREA

I. Pre-Calculus Review: Sigma Notation

In Pre-Calculus, you study sequences and series. Recall that a *series* is just the **sum of a sequence.** The Greek letter sigma is used to denote "sum".

-example- Evaluate each sum.

a. $\sum_{i=1}^{5} 2i$

b. $\sum_{n=1}^{4} \frac{(-1)^{n+1} n}{n+1}$

c. $\sum_{k=0}^{3} (k+1)x^k$

Given a sum, we can write it in sigma notation if we can recognize a pattern.

-example- Write each sum using sigma notation.

a. $\frac{3}{1+1} + \frac{4}{1+2} + \frac{5}{1+3} + \ldots + \frac{12}{1+10}$

b. $\left(\frac{1}{2}\right)\left(1+\frac{1}{4}\right)^2 + \left(\frac{1}{2}\right)\left(1+\frac{2}{4}\right)^2 + \left(\frac{1}{2}\right)\left(1+\frac{3}{4}\right)^2 + \left(\frac{1}{2}\right)\left(1+\frac{4}{4}\right)^2$

II. Area

Consider this problem: Find the area of the region enclosed by the parabola, $y = 1 + x^2$, the vertical lines $x = 1$ and $x = 3$, and the x – axis.

Picture:

Strategy: Since we know how to find the area of a RECTANGLE, we will divide the region into rectangular strips, and add the area.

Estimate 1: Use 4 *left endpoint rectangles* to approximate the area.

Sigma Notation:

Estimate 2: Use 4 *right endpoint rectangles* to approximate the area.

Sigma Notation: