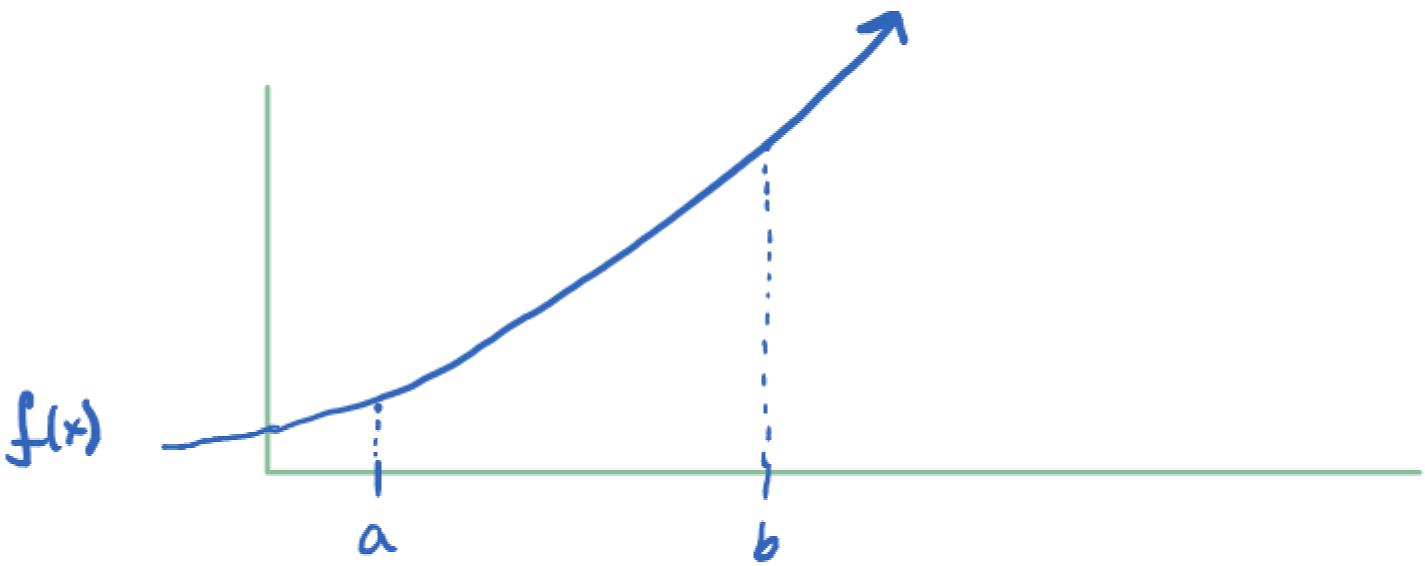
AP Calculus 30L | Mr. Maxwell | Name: ____________________

Summation Notation - Riemann Sums

$$\int_a^b f(x)\,dx = \lim_{n \to \infty} \sum_{k=1}^{n} f(x_k)\,\Delta x$$



$f(x_k)$ can also be written as:

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Δx

Which means the summation notation can be written as:

$$\lim_{n \to \infty} \sum_{k=1}^{n} \left[f\left(a + \frac{b-a}{n} k\right) \right] \left(\frac{b-a}{n}\right)$$

Let's practice rewriting integrals in summation notation…

Eg 1 $\int_0^4 f(x)\,dx \Rightarrow$

Eg 2 $\int_2^9 f(x)\,dx \Rightarrow$

Eg 3 $\int_{-2}^3 f(x)\,dx \Rightarrow$

Now let's substitute the actual function into the summation notation (not just f(x))

Eg 4 $\int_0^4 x^4\,dx \Rightarrow$

Eg 5 $\int_{2}^{4} 3x^2 \, dx \Rightarrow$

Eg 6 $\int_{-1}^{3} 2x + 9 \, dx \Rightarrow$

You may see "i" substituted for "k" in summation notation...

Eg 6 $\lim_{n\to\infty} \sum_{i=1}^{n} \left[\sqrt{2\left(3+\frac{3i}{n}\right)+1}\right]\left(\frac{3}{n}\right)$

As an integral...

Eg 7 $\lim_{n\to\infty} \sum_{i=1}^{n} (3)\left(\frac{5}{n}\right) \Rightarrow$

Eg 8 $\lim_{n\to\infty} \sum_{i=1}^{n} \left[\left(-2+\frac{2i}{n}\right)^3\right]\frac{2}{n} \Rightarrow$

Finney Text
p. 270 #5, 6, 18
p. 282 Quick Rev. #1-6, Ex. #1,3,5,41-45