Precalculus

12-05 Integrals

Properties of Sums

$$\sum_{i=1}^{n} c = cn$$

$$\sum_{i=1}^{n} i = \frac{n(n+1)}{2} = \frac{n^2+n}{2}$$

$$\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} = \frac{2n^3+3n^2+n}{6}$$

$$\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4} = \frac{n^4+2n^3+n^2}{4}$$

- Associative Property

$$\sum_{i=1}^{n} (a_i \pm b_i) = \sum_{i=1}^{n} a_i \pm \sum_{i=1}^{n} b_i$$

- Distributive Property (Factoring)

$$\sum_{i=1}^{n} ka_i = k\sum_{i=1}^{n} a_i$$

Find the limit of $S_n = \sum_{i=1}^{n} \frac{i-5}{n^2}$ as $n \to \infty$

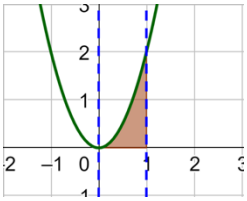
$$\lim_{n\to\infty} \sum_{i=1}^{n} \frac{i-5}{n^2}$$

The Area Problem

- Find the area between the graph and the *x*-axis between two *x*-values *a* and *b*

$$Area = \int_a^b f(x)\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} f\left(a + \frac{b-a}{n} i\right)\left(\frac{b-a}{n}\right)$$

Find the area bounded by $f(x) = 2x^2$ and $x = 0$ and $x = 1$



Find the area bounded by $f(x) = 4x - x^2$ and $x = 1$ to $x = 3$