Rules of summation

Theorem:

① $\displaystyle\sum_{k=1}^{n} c\, a_k = c \sum_{k=1}^{n} a_k.$

② $\displaystyle\sum_{k=1}^{n} (a_k + b_k) = \sum_{k=1}^{n} a_k + \sum_{k=1}^{n} b_k.$

③ $\displaystyle\sum_{k=1}^{n} c = c\, n.$

④ $\displaystyle\sum_{k=1}^{n} k = \frac{n(n+1)}{2}.$

⑤ $\displaystyle\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$

⑥ $\displaystyle\sum_{k=1}^{n} k^3 = \frac{n^2(n+1)^2}{4}.$

Few rules of integration.

Theorem

① $\displaystyle\int_{a}^{a} f(x) = 0$

② $\displaystyle\int_{b}^{a} f(x)\, dx = - \int_{a}^{b} f(x)\, dx.$

③ $\displaystyle\int_{a}^{b} (f(x) + g(x))\, dx = \int_{a}^{b} f(x)\, dx + \int_{a}^{b} g(x)\, dx.$

④ $\displaystyle\int_{a}^{b} c\, f(x)\, dx = c \int_{a}^{b} f(x)\, dx$ for any number c.

⑤ $\displaystyle\int_{a}^{b} f(x)\, dx = \int_{a}^{c} f(x)\, dx + \int_{c}^{b} f(x)\, dx.$

⑥ $\displaystyle\int_{a}^{b} |f(x)|\, dx$ is sum of areas bounded by f and $x-$axis on $[a,b]$