Properties of sums

- $\sum_{i=1}^{n} \lambda = n\lambda$
- $\sum_{i=1}^{n} \lambda a_i = \lambda \sum_{i=1}^{n} a_i$
- $\sum_{i=1}^{n} (a_i + b_i) = \sum_{i=1}^{n} a_i + \sum_{i=1}^{n} b_i$
- $\sum_{i=1}^{n} (a_i - b_i) = \sum_{i=1}^{n} a_i - \sum_{i=1}^{n} b_i$

Properties of the definite integral

If $c \in [a, b]$ and λ is a constant then

- $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx$
- $\int_a^b \lambda\,dx = \lambda(b - a)$
- $\int_a^b [f(x) + g(x)]\,dx = \int_a^b f(x)\,dx + \int_a^b g(x)\,dx$
- $\int_a^b \lambda f(x)\,dx = \lambda \int_a^b f(x)\,dx$

To summarize:

Comparison properties for the integral

- If $f(x) \geq 0$ for $x \in [a, b]$, then

$$\int_a^b f(x)\,dx \geq 0$$

- If $f(x) \geq g(x)$ for $x \in [a, b]$, then

$$\int_a^b f(x)\,dx \geq \int_a^b g(x)\,dx$$

- If $m \leq f(x) \leq M$ for for $x \in [a, b]$, then

$$m(b-a) \leq \int_a^b f(x)\,dx \leq M(b-a).$$