Mean value theorems for integrals

Mean value Theorems for integrals

Theorem 1. (MVT for integrals 1). If f is a continuous function on $[a,b]$, then there exists a number c in $[a,b]$ such that

$$\int_a^b f(x)\,dx = f(c)(b-a).$$

Theorem 2. (MVT for integrals 2). Suppose that f and g are continuous on $[a,b]$, and let $g(x) \geqslant 0$ for all $x \in \mathbb{R}$. Then there exists a number $c \in [a,b]$ such that

$$\int_a^b f(x)\,g(x)\,dx = f(c) \int_a^b g(x)\,dx.$$