Areas Between Curves

MATH 1700

Readings

Readings: Section 6.1

The area between curves case I

Theorem

Let f and g be continuous functions on $[a, b]$ such that $f(x) \geq g(x)$ for all x in $[a, b]$. The area bounded by the curves $y = f(x)$, $y = g(x)$, the line $x = a$ and the line $x = b$ is

$$\int_a^b [f(x) - g(x)]dx.$$

The area between curves case II

Theorem

Let f and g be continuous functions on $[a, b]$. The area bounded by the curves $y = f(x)$, $y = g(x)$, the line $x = a$ and the line $x = b$ is

$$\int_a^b |f(x) - g(x)| dx.$$

Regions bounded by functions of y

If a region A is bounded by the lines $y = c$, $y = d$, and functions $x = f(y)$ and $x = g(y)$ such that $f(y) \geq g(y)$, then

$$\text{Area} = \int_c^d (f(y) - g(y))\, dy.$$

Regions bounded by functions of y

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$$\text{Area} = \int_c^d (f(y) - g(y))\, dy.$$

and in general, when $f(y)$ is not necessarily always greater than $g(y)$,

$$\text{Area} = \int_c^d |f(y) - g(y)| dy.$$