Chapter 5

Area between 2 curves f(x) and g(x) from x = a to x = b: $A = \int_a^b [f(x) - g(x)]\,dx$.

Area between 2 curves f(y) and g(y) from y = c to y = d: $A = \int_c^d [f(y) - g(y)]\,dy$.

Volume of a solid: $V = \int_a^b A(x)dx$ where A(x) is the area of the cross section at x.

Volume of a solid of revolution, method of disks: $V = \int_a^b \pi[f(x)]^2dx$

Volume of a solid of revolution, method of washers: $V = \int_a^b \pi\,[\,(f(x))^2 - (g(x))^2]\,dx$

Volume of a solid of revolution, method of cylindrical shells: $V = \int_a^b 2\,\pi\,f(x)\,dx$

Arc length: $s = \int_a^b \sqrt{1+[f'(x)]^2}\,dx$

Surface Area: $S = \int_a^b 2\,\pi\,f(x)\,\sqrt{1+[f'(x)]^2}\,dx$

Work : $W = \int_a^b F(x)dx$

First moment: $m = \int_a^b x\rho(x)\,dx$

Suppose that X is a random variable that may assume any value x with $a \le x \le b$. A **probability density function** for X is a function f(x) satisfying
(i) $f(x) \ge 0$ for $a \le x \le b$
(ii) $\int_a^b f(x)\,dx = 1$
(iii) The probability that the (observed) value of X falls between c and d is given by the area under the graph of the pdf on that interval. That is $P(c \le X \le d) = \int_c^d f(x)\,dx$

The **mean μ of a random variable** with pfd f(x) on the interval [a,b] is given by $\mu = \int_a^b x\,f(x)\,dx$.