

INTEGRALS					
			Applications		
Function	Domain	Integral	If $f > 0$	If $f=1$	If f is density
$f(x)$	Interval $[a,b]$ R	$\int_a^b f(x) dx$	Area under f	length $[a,b]$	mass of wire $[a,b]$
$f(x,y)$	Region D in R^2	$\iint_D f(x,y) dA$	Volume under f	Area of D	mass of lamina D
$f(x,y,z)$	Solid E in R^3	$\iiint_E f(x,y,z) dV$		Volume of E	mass of solid E
$f(x, y)$	Curve $C: r(t)$ R^2	$\int_C f(x,y) ds = \int_{t_1}^{t_2} f(x(t),y(t)) \sqrt{\frac{dx}{dt}^2 + \frac{dy}{dt}^2} dt$	"curtain" area	Length of C	mass of wire C
$f(x, y, z)$	Curve $C: r(t)$ R^3	$\int_C f(x,y,z) ds = \int_{t_1}^{t_2} f(x(t),y(t),z(t)) \sqrt{\frac{dx}{dt}^2 + \frac{dy}{dt}^2 + \frac{dz}{dt}^2} dt$		Length of C	mass of wire C
$f(x, y, z)$	Surface $S: z = g(x,y)$	$\iint_S f(x,y,z) dS = \iint_D f(x,y,g(x,y)) \sqrt{g_x^2 + g_y^2 + 1} dA$		Surface area of S	mass of surface S