Integral

`integral(f,x)` returns the integral of f with respect to x.

```
integral(x^2,x)
```

$\frac{1}{3}x^3$

Extend the argument list for multiple integrals.

```
f = x y
integral(f,x,y)
```

$\frac{1}{4}x^2y^2$

`defint(f,x,a,b)` computes the definite integral of f with respect to x evaluated from a to b. The argument list can be extended for multiple integrals. The following example computes the integral of $f = x^2$ over the domain of a semicircle. For each x along the abscissa, y ranges from 0 to $\sqrt{1 - x^2}$.

```
defint(x^2, y, 0, sqrt(1 - x^2), x, -1, 1)
```

$\frac{1}{8}\pi$

Alternatively, `eval` can be used to compute a definite integral step by step.

```
I = integral(x^2,y)
I = eval(I,y,sqrt(1 - x^2)) - eval(I,y,0)
I = integral(I,x)
eval(I,x,1) - eval(I,x,-1)
```

$\frac{1}{8}\pi$

Here is a useful trick. Integrals involving sine and cosine can often be solved using exponentials. For example, the definite integral

$$\int_0^{2\pi} \left(\sin^4 t - 2\cos^3(t/2)\sin t\right) dt$$

can be solved as follows.

```
f = sin(t)^4 - 2 cos(t/2)^3 sin(t)
f = circexp(f)
defint(f, t, 0, 2 pi)
```

$\frac{3}{4}\pi - \frac{16}{5}$