Complex numbers

Symbol `i` is initialized to $\sqrt{-1}$.

Complex quantities can be entered in either rectangular or polar form.

```
a + i b
```

$a + ib$

```
exp(1/3 i pi)
```

$\exp\left(\frac{1}{3} i\pi\right)$

Converting a complex number to rectangular or polar coordinates causes simplification of mixed forms.

```
A = 1 + i
B = sqrt(2) exp(1/4 i pi)
A - B
```

$1 + i - 2^{1/2} \exp\left(\frac{1}{4} i\pi\right)$

```
rect(last)
```

0

Rectangular complex quantities, when raised to a power, are multiplied out.

```
(a + i b)^2
```

$a^2 - b^2 + 2iab$

When a and b are numerical and the power is negative, the evaluation is done as follows.

$$(a+ib)^{-n} = \left(\frac{a-ib}{(a+ib)(a-ib)}\right)^n = \left(\frac{a-ib}{a^2+b^2}\right)^n$$

Here are a few examples.

```
1/(2 - i)
```

$\frac{2}{5} + \frac{1}{5} i$

```
(-1 + 3 i)/(2 - i)
```

$-1 + i$

The absolute value of a complex number returns its magnitude.

```
abs(3 + 4 i)
```

5

The imaginary unit can be changed from i to j by defining $j = \sqrt{-1}$.

```
j = sqrt(-1)
sqrt(-4)
```

$2j$