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 \text{ 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)
```

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)
```

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

```
j = sqrt(-1)
sqrt(-4)
2j
```