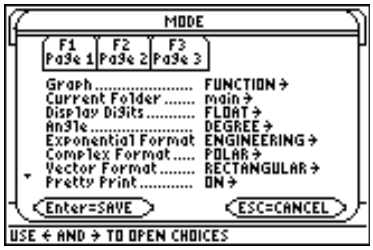
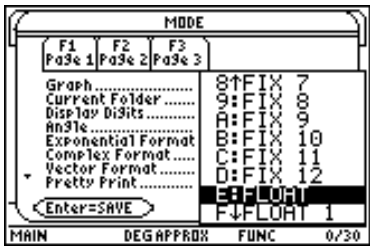
# TI-89 Complex Numbers

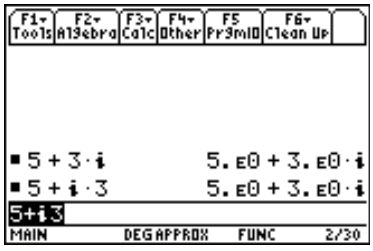
This handout covers the differences between the TI-86 and TI-89 in regards to complex numbers. TI-89 users should also have the TI-86 handout for numeric examples.




(1-1)




(1-2)




(3-1)

1. Choosing the Correct Format

<Mode> for the "Mode" screen. See (1-1) at left.
<Down> to the "Display Digits..." line.
<Right> to see the modes available (1-2).
Choose a decimal point format. (Refer to page 550 of your manual for the TI-89 digit formats.)
<Enter> to accept the decimal point format.
<Down> to the "Angle...." line.
<Right> to see the list of available formats.
Choose an angle format.
<Enter> to accept the angle format.
<Down> to the "Complex Format" line.
<Right> to see the list of available formats.
Choose a complex format.
<Enter> to accept the complex format.
Note: For our purposes, there is no difference between "Real" and "Rectangular". (Refer to page 551 of your manual for the TI-89 complex formats.)
<Enter> to keep all of your changes and return to the main screen.

2. Polar Operations

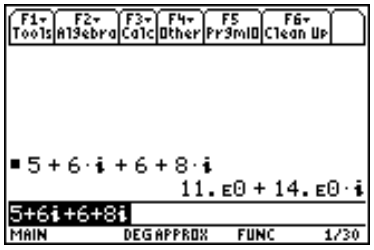
There are no differences between the TI-86 and TI-89 for Polar entry. The "<" sign is the second function of the <EE> key in the far left column of keys on the calculator. Polar numbers must be entered in parentheses as with the TI-86. Also, as with the TI-86, it is possible to mix degrees and radians in an equation but this can also increase the chances of making a mistake. If you wish to experiment, access the "Math" menu by pushing <2nd><5> and then push <2> for the "Angle" operations.

3. Rectangular Operations

Note: These examples will be only in Rectangular format.

Where the TI-86 requires complex numbers in the rectangular format A+jB to be entered as (A,B), the TI-89 uses a more mathematical input. On the TI-86, 5 + j3 would be (5,3); on the TI-89, 5 + j3 would be displayed as in (3-1) at left. Note that either input produces the same result.

***i*** is the second function of the <Catalog> key.



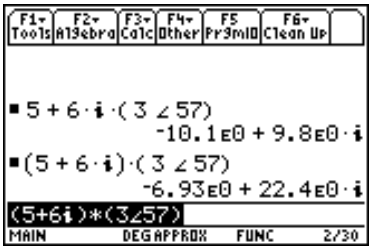

(3-2)

To be safe in your calculations, it is best to place your rectangular complex number entry in parentheses even though the TI-89 does not require it. Compare the calculations at left to the two examples in Step 5 of the TI-86 Complex Numbers handout.

Comparing (3-2) to (5-1), there is no difference in the result since this is a simple addition operation.

However, comparing the two entries of (3-3) at left to (5-2), you see there can be a large difference between the answers depending on how you enter the equations.

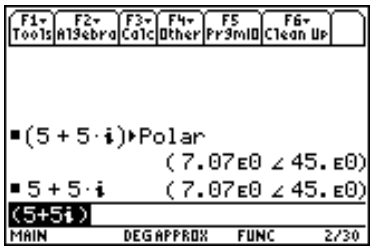
**When in doubt, use parentheses for any complex number regardless of its format.**




(3-3)

4. Conversions

Like the TI-86, an easy way to do conversions is to be in the "Mode" of the desired result. However, like the TI-86, the TI-89 can convert complex numbers directly using built in conversion functions.
Enter the complex number to convert
<2nd><5> for the "Math" menu
<4> for the "Matrix" menu
<Alpha><4> for "L" or <Down> to go to the "Vector Ops"
<4> to convert to Polar or <5> to convert to Rectangular
<Enter>
<Enter>
For example, to convert 5 + j5 to polar would be as displayed in (4-1) at left. The top entry is using the conversion functions described above. The bottom entry is using the direct method after setting "Complex Format" to "Polar" in the "Mode" screen (1-1). As you can see, the entries are almost identical and achieve the same results. The bottom entry, however, requires fewer key strokes.




(4-1)