Complex Numbers: Scientific Calculators (41:47)

Identify the proper settings for the TI-89.

Describe how to enter a complex number in polar format in the TI-89. Identify the location of the phasor angle symbol.

Describe how to enter a complex number in rectangular format in the TI-89. Identify the location of the **j** symbol.

When the TI-89 is setup in polar mode explain what happens when one enters a complex number using rectangular format.

Explain how to use the TI-89 to convert from polar to rectangular format.

Identify the CATALOG entries capable of isolating individual components of a complex number.

Explain how to use the TI-89 to negate a complex number. Discuss complications negating complex numbers in rectangular format.

Identify the CATALOG entry capable of forming the complex conjugate of a complex number.

Given these complex numbers determine the desired qualities using the scientific calculator.

1. POLAR: $\bar{A} = 11.3\angle 59.8°$
   RECTANGULAR: $\bar{A} =$
2. RECTANGULAR: $\bar{B} = -5.4 + j9.1$
   POLAR: $\bar{B} =$
3. $\bar{C} = 11.5\angle -125.5°$
   real =
4. $\bar{D} = 7.9\angle -36°$
   imaginary =
5. $\bar{E} = 1.2 + j7.9$
   magnitude =
6. $\bar{F} = -3.0 + j4.4$
   angle =
7. $\bar{G} = 3.7\angle -66.2°$
   $-\bar{G} =$
8. $\bar{H} = -4.0 - j4.1$
   POLAR:
   $-\bar{H} =$
   RECTANGULAR:
   $-\bar{H} =$
9. $\bar{G} = 3.7\angle -66.2°$
   $\bar{G}^* =$
10. $\bar{H} = -4.0 - j4.1$
    POLAR:
    $\bar{H}^* =$
    RECTANGULAR:
    $\bar{H}^* =$
11. POLAR: $\bar{I} = 20.1\angle 31°$
    RECTANGULAR: $\bar{I} =$
    real =
    imaginary =
    magnitude =
    angle =
    $-\bar{I} =$
    $\bar{I}^* =$

Given these complex numbers determine the desired qualities using the scientific calculator.

(12) POLAR: $\bar{A} = 4.4 \angle 69.9^\circ$
RECTANGULAR: $\bar{A} =$

real =
imaginary =
magnitude =
angle =
$-\bar{A} =$
$\bar{A}^* =$

(13) RECTANGULAR: $\bar{B} = -1.6 + j5.3$
POLAR: $\bar{B} =$

real =
imaginary =
magnitude =
angle =
$-\bar{B} =$
$\bar{B}^* =$

Given these arguments perform the desired operations expressing your final answer in the desired format.

(1) $\bar{A} = 7.8 \angle 8.1^\circ$
$\bar{B} = 7.8 \angle 124.1^\circ$
POLAR:
$\bar{A} * \bar{B} =$

(1) $\bar{A} = -5.7 - j9.9$
$\bar{B} = 9.8 \angle -81.1^\circ$
POLAR:
$\bar{A} / \bar{B} =$

(3) $\bar{A} = 2.4 \angle 62.4^\circ$
$\bar{B} = -9.8 + j4.7$
POLAR:
$\bar{A} + \bar{B} =$

(4) $\bar{A} = -6.4 - j0.5$
$\bar{B} = 1.7 - j8.2$
RECTANGULAR:
$\bar{A} - \bar{B} =$

(5) $\bar{A} = 9.7 \angle 71.9^\circ$
POLAR:
$\bar{A}^2 =$

(6) $\bar{A} = -5.7 + j7.5$
POLAR:
$\bar{A}^3 =$

Given these arguments perform the desired operations expressing your final answer in the desired format.

(7) $\bar{A} = 10.9 \angle 154.4^\circ$
$\bar{B} = 1.1 + j2.1$
POLAR:
$\bar{A} - \bar{B} =$

(8) $\bar{A} = 8.1 \angle 52.6^\circ$
$\bar{B} = 9.8 \angle 170.1^\circ$
RECTANGULAR:
$\bar{A} * \bar{B} =$

(9) $\bar{A} = 3.0 \angle -170.5^\circ$
$\bar{B} = 5.6 - j9.8$
POLAR:
$\bar{A} / \bar{B} =$

(10) $\bar{A} = 5.9 \angle 56.9^\circ$
$\bar{B} = 0.4 \angle 123.7^\circ$
POLAR:
$\bar{A} + \bar{B} =$

(11) $\bar{A} = -7.0 - j8.7$
POLAR:
$\bar{A}^2 =$

(12) $\bar{A} = 9.8 \angle 12.3^\circ$
$\bar{B} = 7.0 + j7.2$
$\bar{C} = 4.5 \angle 30.5^\circ$
POLAR:
$\dfrac{\bar{A}}{\bar{B} + \bar{C}} =$

Given these arguments perform the desired operations expressing your final answer in the desired format.

① $\bar{Z}_1 = 200\angle 0°$
$\bar{Z}_2 = 300\angle 85°$
$\bar{Z}_T = \dfrac{\bar{Z}_1 \cdot \bar{Z}_2}{\bar{Z}_1 + \bar{Z}_2}$
$\bar{Z}_T = ?$

② $\bar{Z}_1 = 120\angle 0°$
$\bar{Z}_2 = 400\angle 15°$
$\bar{Z}_3 = 550\angle -10°$
$\dfrac{1}{\bar{Z}_T} = \dfrac{1}{\bar{Z}_1} + \dfrac{1}{\bar{Z}_2} + \dfrac{1}{\bar{Z}_3}$
$\bar{Z}_T = ?$

③ $\bar{E} = 24\angle 0$
$\bar{V}_2 = 11.8\angle 59.7°$
$\bar{E} = \bar{V}_1 + \bar{V}_2$
$\bar{V}_1 = ?$

④ $\bar{E} = 120\angle 0$
$\bar{Z}_1 = 240\angle 0°$
$\bar{Z}_2 = 171\angle 82°$
$\bar{V}_1 = \dfrac{\bar{Z}_1}{(\bar{Z}_1 + \bar{Z}_2)} \cdot E$
$\bar{V}_1 = ?$

⑤ $\bar{I}_T = 0.120\angle 0°$
$\bar{I}_1 = 0.085\angle 54.1°$
$\bar{I}_T = \bar{I}_1 + \bar{I}_2$
$\bar{I}_2 = ?$

⑥ $\bar{I}_T = 0.220\angle 0°$
$\bar{Z}_{wd} = 180\angle 0°$
$\bar{Z}_{mot} = 300\angle -90°$
$\bar{I}_{wd} = \dfrac{\bar{Z}_{mot}}{\bar{Z}_{wd} + \bar{Z}_{mot}} \cdot \bar{I}_T$
$\bar{I}_{wd} = ?$

Explain how the summation of the three complex numbers below result in a complex number without an imaginary component or angle.

$\bar{Z}_1 = 200$
$\bar{Z}_2 = 14 + j150$
$\bar{Z}_3 = -j150$

Explain how the summation of the three complex numbers below result in a complex number without an imaginary component or angle.

$\bar{E}_1 = 120\angle 0°$
$\bar{E}_2 = 120\angle -120°$
$\bar{E}_3 = 120\angle +120°$

Given **S**$_1$ known to be in the first quadrant with a magnitude of 50 and a real component of 32 and **S**$_2$ with a magnitude of 24 and an imaginary component of -24, account for the fact that the operation **S**$_1$ + **S**$_2$ yields only a real component.

Which complex number format do you prefer, rectangular or polar?