Complex Number Conversion on Your Schulich Calculator

ENGG 225, Winter 2020

Below is a quick summary of how to convert complex numbers between polar notation and rectangular notation. This is a very important process to help you deal with the manipulation of expressions using complex numbers. Instructions are given for all three of the calculators sanctioned by the Schulich School of Engineering for use in common-core Engineering courses.

A. The Casio *fx-300MS*

Rectangular $\longrightarrow$ Polar

For conversion from rectangular to polar representation, use the example key sequence shown at right. The example shown converts $10 - j10$ to polar, producing $14.142\angle\text{-}45°$. By default, the magnitude will be shown on the display.

| **Pol(** | 10 | **,** | -10 | **)** | **=** |

To display magnitude: **RCL** **cos** E

To display angle: **RCL** **tan** F

Polar $\longrightarrow$ Rectangular

For conversion from polar to rectangular representation, use the example key sequence at right. The example shown converts $14.142\angle\text{-}45°$ back to rectangular form $10 - j10$. By default, the real part will be shown on the display.

SHIFT   Rec(

◯ **Pol(** 14.414 **,** -45 **)** **=**

To display real part: **RCL** **cos** E

To display imaginary: **RCL** **tan** F

Choosing Units for Angles

To choose between Degrees, Radians, or Gradians, touch the MODE key twice, and the display will show your choices, as shown at right. Press 1, 2, or 3 to make your selection.

MODE   MODE

```
Deg   Rad   Gra
 1     2     3
```

B. The Texas Instruments *TI-30XIIS*

Conversion between rectangular and polar representation is managed by a single calculator key and a simple on-screen menu. To select either conversion, bring up the conversion menu shown at right, and use the arrow keys to navigate to the desired conversion.

R↔P
2nd o'"   *Select conversion*

```
R▶Pr  R▶Pθ
----
```

Rectangular $\longrightarrow$ Polar

In the conversion screen above, make sure the R→Pr is underlined, and press ENTER. Then key in the sequence shown at right. The example shown converts $10 - j10$ to polar, producing $14.142\angle\text{-}45°$.

10 (2nd) [,] [ )] [(-)] 10 [ )] [=]

The magnitude will be shown on the display. To calculate the angle, you will need to repeat this process using R→Pθ. To avoid having to rekey the whole sequence, press the uparrow key once, and then edit your previous command by simply selecting the R→Pθ conversion, and press ENTER.

Polar $\longrightarrow$ Rectangular

In the conversion screen above, scroll to the right with the arrow keys and make sure the P→Rx is underlined, and press ENTER. Then key in the sequence shown at right. The example shown converts $14.142\angle\text{-}45°$ to rectangular, producing $10 - j10$.

14.142 (2nd) [,] [ )] [(-)] 45 [ )] [=]

The real part will be shown on the display. To calculate the imaginary part, you will need to repeat this process using P→Ry . To avoid having to rekey the whole sequence, press the uparrow key once, and then edit your previous command by simply selecting the P→Ry conversion, and press ENTER.

Choosing Units for Angles

To choose between Degrees, Radians, or Gradians, touch the DRG key, and the display will show your choices, as shown at right. Use the arrow keys to underline your appropriate choice, and press ENTER.

[DRG]

```
DEG   RAD   GRD
---
```
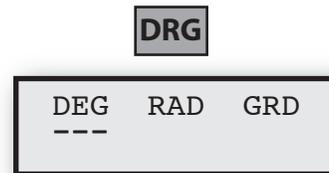
C. The Casio *fx-260Solar*

Rectangular $\longrightarrow$ Polar

For conversion from rectangular to polar representation, use the example key sequence shown at right. The example shown converts $10-j10$ to polar, producing $14.142\angle\text{-}45°$. The magnitude will be shown on the display. The display can be toggled between magnitude and angle using the second key sequence shown at right.

SHIFT

10 [ ] [R▸P] 10 [+/-] [=]

Toggle display between magnitude and angle:

SHIFT

[ ] [X↔Y]

Polar $\longrightarrow$ Rectangular

For conversion from polar to rectangular representation, use the example key sequence at right. The example has $14.142\angle\text{-}45°$ converted back to rectagular form $10 - j10$. The real part will be shown on the display. The display can be toggled between the real and imaginary parts using the second key sequence shown at right.

SHIFT

14.142 [　　] [P▸R] 45 [+/-] [=]

Toggle display between real and imaginary parts:

SHIFT

[　　] [X↔Y]

Choosing Units for Angles

To choose between Degrees, Radians, or Gradians, touch the MODE key, and then press 4, 5, or 6 to make your selection.

Degrees: [MODE] [4]

Radians: [MODE] [5]

Gradians: [MODE] [6]

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