

0.11 Polar Graphing

To graph a polar equation $r = f(\theta)$, we must

- change the calculator *mode setting* to *Polar* (directions follow).
- enter the function, using r and θ .

On the TI-83, θ is the same key as x .

On the TI-89, use the green diamond and $\boxed{\wedge}$ to get θ .

On the TI-86, use $\boxed{\text{F1}}$ to get θ .

- set the window appropriately. We have settings for

θ_{\min} smallest value of θ to be evaluated

θ_{\max} largest value of θ to be evaluated

θ_{step} increment of θ values $\left(\text{try } \frac{\pi}{24} \text{ or } \frac{\pi}{48}\right)$

(This determines the number of points that will be plotted.)

x_{\min} smallest value for horizontal viewing display

x_{\max} largest value for horizontal viewing display

x_{scl} scale for horizontal display

y_{\min} smallest value for vertical viewing display

y_{\max} largest value for vertical viewing display

y_{scl} scale for vertical display

- draw the graph.

Work to show on paper (same as other graphs, with the addition of values for θ):

1. function definition $r_1 = 4\cos(5/2\theta)$
2. window values for θ , x , and y , such as $[0, 2\pi]$, $[-1, 1]$, $[-2, 2]$
Use exact values in radians for θ .
3. the graph

Change the Mode Setting

TI-83: Polar Mode

Press **Mode** to see the left screen below. Scroll down to Func, then arrow to the right to Pol (right screen). Press **Enter** to save the selection, then **2nd** and **Quit** to exit the mode settings.

```
Normal Sci Eng
Float 0123456789
Radian Degree
Func Par Pol Seq
Connected Dot
Sequential Simul
Real a+bi re^θi
Full Horiz G-T
```

```
Normal Sci Eng
Float 0123456789
Radian Degree
Func Par Pol Seq
Connected Dot
Sequential Simul
Real a+bi re^θi
Full Horiz G-T
```

To return to graphing in the rectangular coordinate system, be sure to change the Mode setting back to Func.

TI-89: Polar Mode

Press **Mode** to see the left screen below. Currently, Graph is probably showing Function. Arrow to the right to see the middle screen below. Then hit 3, or arrow down to Polar and press **Enter**, to see the right screen. Now press **Enter** to save the selection and to exit the mode settings.

```
MODE
F1 F2 F3
Page 1 Page 2 Page 3
Graph..... FUNCTION →
Current Folder..... main →
Display Digits..... FLOAT 12 →
Angle..... RADIAN →
Exponential Format..... NORMAL →
Complex Format..... REAL →
Vector Format..... RECTANGULAR →
Pretty Print..... ON →
Enter=SAVE      ESC=CANCEL
```

MAIN **■** RAD APPROX POL

```
MODE
F1 F2 F3
Page 1 Page 2 Page 3
Graph..... 1:FUNCTION
Current Fo..... 2:PARAMETRIC
Display Dis..... 3:POLAR
Angle..... 4:SEQUENCE
Exponential..... 5:3D
Complex F..... 6:DIFF EQUATIONS
Vector For.....
Pretty Pri.....
Enter=SAVE      ESC=CANCEL
```

TYPE OR USE ←↑↓→ (ENTER) OR (ESC)

```
MODE
F1 F2 F3
Page 1 Page 2 Page 3
Graph..... 1:FUNCTION
Current Fo..... 2:PARAMETRIC
Display Dis..... 3:POLAR
Angle..... 4:SEQUENCE
Exponential..... 5:3D
Complex F..... 6:DIFF EQUATIONS
Vector For.....
Pretty Pri.....
Enter=SAVE      ESC=CANCEL
```

MAIN RAD APPROX POL

To return to graphing in the rectangular coordinate system, be sure to change the Mode setting back to Function.

TI-86: Polar Mode

Press **Mode** to see the left screen below. Scroll down to RectC and change it to PolarC, then change Func to Pol (right screen). Press **Enter** to save the selection, then **2nd** and **Quit** to exit the mode settings.

```
Normal Sci Eng
Float 012345678901
Radian Degree
RectC PolarC
Func Pol Param DifEq
Dec Bin Oct Hex
RectC CylV SphereV
dxDer1 dxNDer
```

```
Normal Sci Eng
Float 012345678901
Radian Degree
RectC PolarC
Func Pol Param DifEq
Dec Bin Oct Hex
RectC CylV SphereV
dxDer1 dxNDer
```

To return to graphing in the rectangular coordinate system, be sure to change the Mode setting back to RectC and Func.