

Chapter 6 / **Example 31**

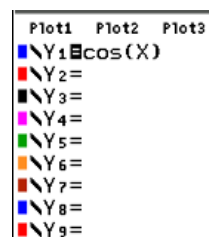
# Using an inverse function

- Sketch the graph of  $y = \cos x$ .
- Determine the domain for a one-to-one function to occur.
- Draw the inverse function.
- Use the graph to calculate  $\arccos(-0.6)$ .

Press  $[f1]$   $[y=]$  to display the equation entry screen.

Type  $\cos(x)$  and press  $[enter]$  to enter the equation as  $Y_1$ .

Press  $[X\Delta Y]$   $[f1]$  1:n/d to add a fraction template.



```

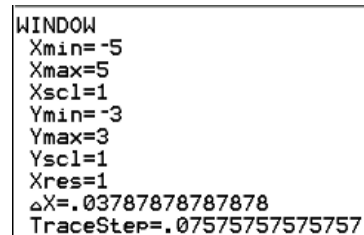
Plot1 Plot2 Plot3
Y1=cos(X)
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
Y8=
Y9=

```

Press  $[f2]$   $[window]$

Set the axes to show  $-5 \leq x \leq 5$  and  $-3 \leq y \leq 3$

Press  $[f3]$   $[zoom]$  5:ZSquare when you have finished.

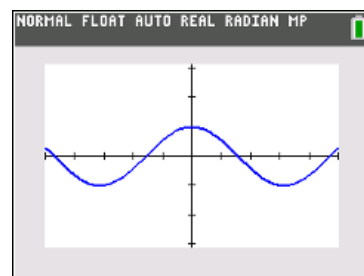


```

WINDOW
Xmin=-5
Xmax=5
Xscl=1
Ymin=-3
Ymax=3
Yscl=1
Xres=1
ΔX=.03787878787878
TraceStep=.07575757575757

```

The GDC now displays the function  $Y_1 = \cos(x)$  in a suitable window.



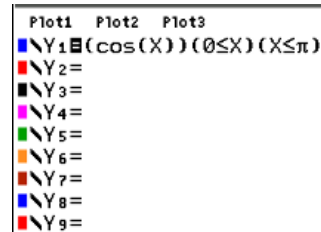
Restrict the domain to  $0 \leq x \leq \pi$ .

Press  $[f1]$   $[y=]$  to display the equation entry screen.

Put  $\cos(x)$  in parentheses. Type  $(0 \leq x)(x \leq \pi)$  and press  $[enter]$ .

To enter  $\leq$  press  $[2nd]$   $[math]$   $[test]$  6: $\leq$

Press  $[f5]$   $[graph]$  when you have finished.



```

Plot1 Plot2 Plot3
Y1=(cos(X))(0≤X)(X≤π)
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
Y8=
Y9=

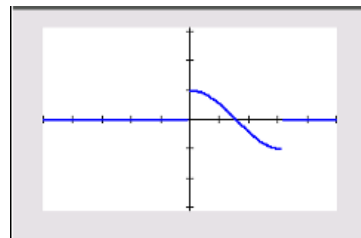
```

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# Using an inverse function

The GDC now displays the function  $f_1(x) = \cos(x)$  with its limited domain so that it is one-to-one.

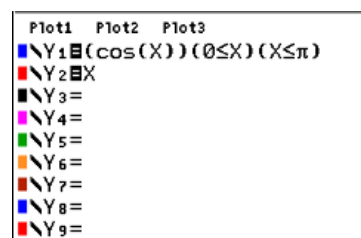
The TI-84 Plus C also shows  $y = 0$  outside the given domain.



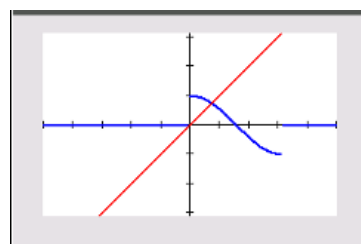
Press  $\boxed{\text{f1}}$   $\boxed{\text{y=}}$  to display the equation entry screen.

Type  $x$  and press  $\boxed{\text{enter}}$  to enter the equation as  $Y_2$ .

Press  $\boxed{\text{f5}}$   $\boxed{\text{graph}}$  when you have finished.



The GDC now displays the line  $y = x$  to reflect the curve  $y = \cos(x)$  to show its inverse.

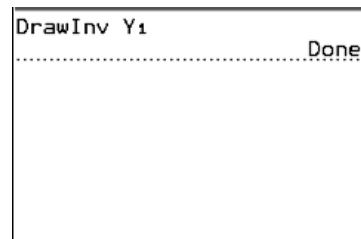


To show the inverse of  $f_1(x) = \cos(x)$

Press  $\boxed{2\text{nd}}$   $\boxed{\text{prgm}}$   $\boxed{\text{draw}}$  8:DrawInv

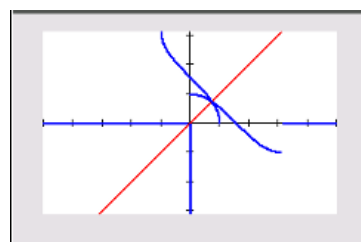
Enter  $Y_1$  by pressing  $\boxed{\text{X}\text{L}\text{X}\text{X}}$   $\boxed{\text{f4}}$  1: $Y_1$

Press  $\boxed{\text{enter}}$ .



The inverse of  $y = \cos(x)$  is now displayed.

This is  $y = \arccos(x)$  which is  $y = \cos^{-1}(x)$  on the TI-84 Plus C

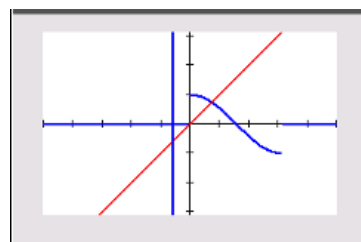


To draw the line  $x = -0.6$

Press  $\boxed{2\text{nd}}$   $\boxed{\text{mode}}$   $\boxed{\text{quit}}$

Press  $\boxed{2\text{nd}}$   $\boxed{\text{prgm}}$   $\boxed{\text{draw}}$  4:Vertical and type  $-0.6$  and press  $\boxed{\text{enter}}$ .

The GDC displays the line.



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# Using an inverse function

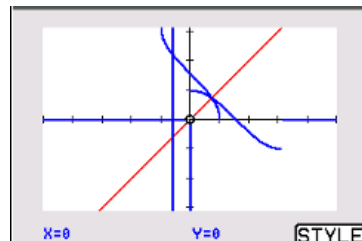
When lines are 'drawn' and not 'plotted' with a TI-84 Plus C, it is not possible to trace them or find intersections etc.

It is possible to find the intersection approximately.

Press **2nd** **prgm** **[draw]**

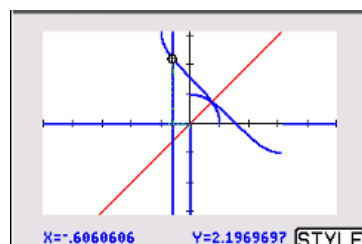
Press **▸** to select POINTS and select 1:Pt-On(

Press **enter**.



Position the cursor using **▴** **▾** **▸** **◀** carefully at the point of intersection.

At this scale, the best approximation is  $(-0.6, 2.2)$



By using a combination of Zoom In and ZDecimal, you can get much closer.

The solution is  $\arccos(-0.6) = 2.21$ .

