

Chapter 6 / **Example 31**

Using an inverse function

- a** Sketch the graph of $f(x) = 2\cos\left(\frac{x}{2}\right)$.
- b** Determine the domain for a one-to-one function to occur.
- c** Sketch the inverse function, $f^{-1}(x)$.
- d** Use the graph to find the value of x for which $f(x) = f^{-1}(x)$.

Press **MENU** 5 **GRAPH** **Y-VIEW** to display the equation entry screen.

Type $\cos x$ and press **EXE** to enter the equation as Y1.

Press **□** to use the fraction template.

Graph Func :Y=
Y1:cos x [—]
Y2: [—]
Y3: [—]
Y4: [—]
Y5: [—]
Y6: [—]
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]

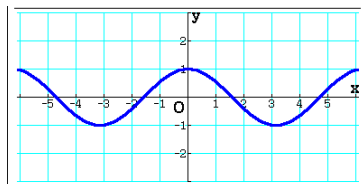
Press **SHIFT** **F3** V-WIN.

Change the settings to $-3 \leq y \leq 3$ and press **F5** SQUARE **F1** Y-BASE

Press **EXIT** and **F6** DRAW when you have finished.

View Window
Xmin : -6.0967741
max : 6.09677419
scale: 1
dot : 0.03225806
Ymin : -3
max : 3
[INITIAL] [TRIG] [STANDARD] [V-MEM] [SQUARE]

The GDC now displays the function $Y1 = \cos x$ in a window with square (equal) axes.



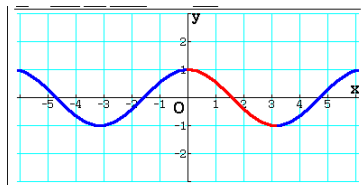
Restrict the domain to $0 \leq x \leq \pi$.

Enter the function type $Y2 = \cos x, [0, \pi]$

Graph Func :Y=
Y1:cos x [—]
Y2:cos x, [0, π] [—]
Y3: [—]
Y4: [—]
Y5: [—]
Y6: [—]
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]

Press **F6** DRAW to display the graph screen.

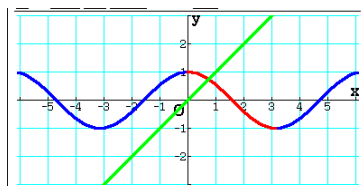
The GDC now displays the function $Y1 = \cos x$ in blue and the function with its limited domain so that it is one-to-one in red.



Press **EXIT** and enter the function $Y3 = x$.

Press **F6** DRAW.

The GDC now shows the function and the line it will be reflected in to show its inverse.



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Using an inverse function

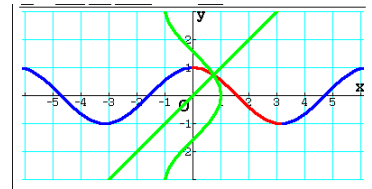
To show the inverse of $y = \cos x$ you are going to use Sketch.

Press **F4** Sketch, **F4** Inverse

Select the curve Y1 using \blacktriangle if necessary and press **EXE**.

The inverse of $y = \cos x$ is now displayed. (By inspection, the range of the inverse function will be limited to $[0, \pi]$).

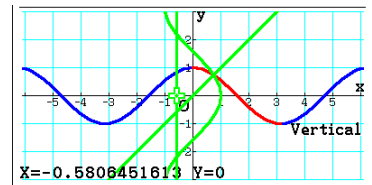
Note that the fx-CG50 will not sketch the inverse of F2 as it has a limited domain.



To draw the line $x = -0.6$

Press **F4** Sketch, **F6** > **F4** Vertical

Press \blacktriangleleft so that the line is as close as possible to -0.6 and press **EXE**.

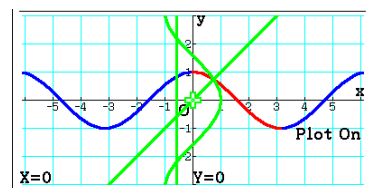


Because this is a sketch and not a plotted function, it is not possible to use it to for any of the G-Solve functions.

It is possible to find the intersection approximately.

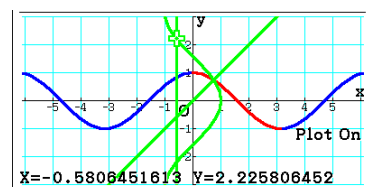
Press **EXIT** to display the coordinates.

Press **F4** Sketch, **F6** > **F1** PLOT **F2** PlotOn



Position the cursor using \blacktriangleleft \blacktriangleright \blacktriangleup \blacktriangledown carefully at the point of intersection.

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



By zooming in, you can get much closer.

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

