

Chapter 6 / **Example 31**

Using an inverse function

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

Open a new document and add a Graphs page.

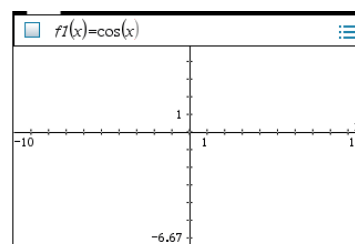
The entry line is displayed at the top of the work area.

The default graph type is function, so 'f1(x)= ' is displayed.

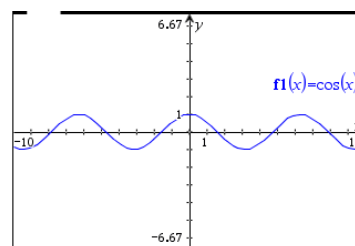
The default axes are $-10 \leq x \leq 10$ and $-6.67 \leq y \leq 6.67$.

Enter $\cos(x)$ and press **enter**.

Press **trig** and select \cos from the menu with the touchpad.



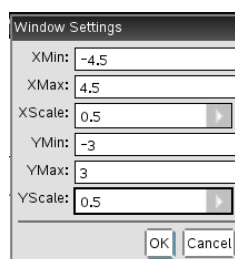
The GDC displays the graph $f1(x) = \cos x$ with the default axes.



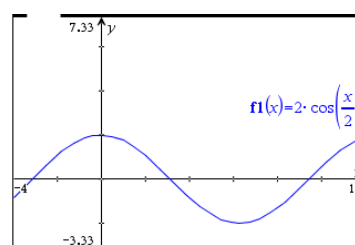
Set a suitable domain with equal scales so that the axes are square.

Press **menu** 4:Window/Zoom | 1:Window Settings...

Change the settings to $-4.5 \leq x \leq 4.5$ and $-3 \leq y \leq 3$ with scales of 0.5. Press **enter**.



The GDC now displays the function $f1(x) = \cos x$ in a suitable window.



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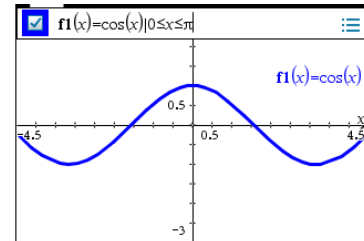
Restrict the domain to $0 \leq x \leq \pi$.

Press **tab** to display the entry line and scroll up to 'f1(x)'.

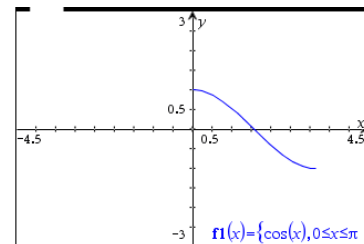
Press **ctrl** **=** **[>=]** and select |

Type $0 \leq x \leq \pi$ using **ctrl** **=** **[>=]** to enter \leq .

Use **π** to enter π .



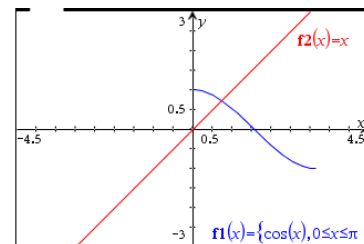
The GDC now displays the function $f1(x) = \cos x$ with its limited domain so that it is one-to-one.



Press **tab** to display the entry line again. This time 'f2(x)= ' is displayed.

Type x and press **enter**.

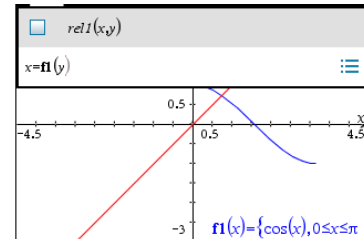
The GDC now displays the line $y = x$ to reflect the curve $y = \cos x$ to show its inverse.



To enter the inverse of $f1(x) = \cos x$ you are going to use the method of replacing x and y so that the inverse relation is $x = f1(y)$.

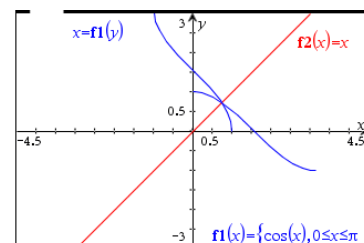
Press **menu** 3:Graph Entry/Edit | 2:Relation

Type $x = f1(y)$ and press **enter**.



The GDC now displays $y = \cos x$, $y = x$ and the inverse function $x = \cos y$ reflected in $y = x$.

The inverse is the same as the function $y = \arccos(x)$

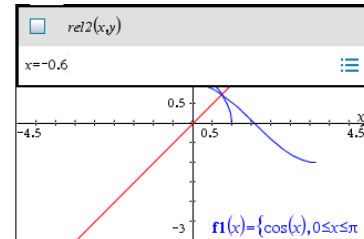


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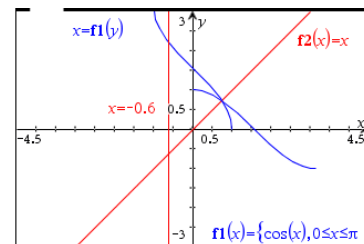
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Press **tab** to display the entry line again. This time ' $\text{rel2}(x,y)$ ' is displayed.

Type $x = -0.6$ and press **enter**.

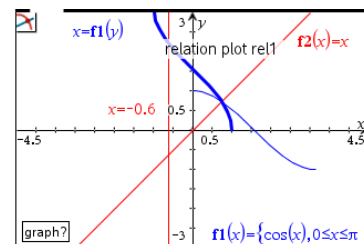


The GDC now displays $x = -0.6$ along with the other graphs.

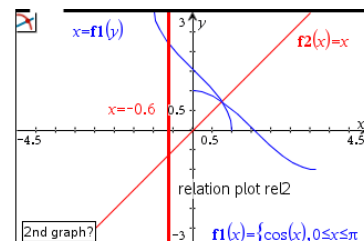


Press **menu** 6:Analyse Graph | 4:Intersection

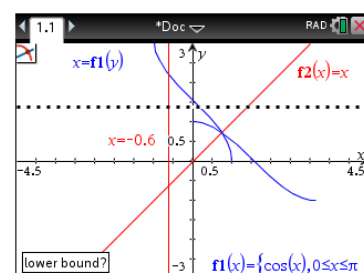
The GDC asks you to select one of the graphs. Select relation plot rel1. Press **enter**.



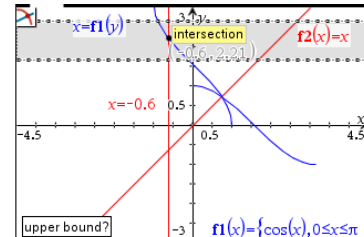
The GDC asks you to select another graph. Select relation plot rel2. Press **enter**.



The GDC now asks you for a lower bound. Choose a point below the intersection. Press **enter**.



Choose a second point above the intersection. Press **enter**.



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The GDC displays the intersection of the inverse function and the line at the point $(-0.6, 2.21)$.

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

