

Tips and Tricks: Finding exact value solutions to trig equations

This is a bit involved, but it does work nicely once you get the hang of it. However, it's a bit questionable really whether it's easier to do it by hand!

As an example, we'll use the Solve aplet to solve for x in the equation $2\sin x + 2 = 1$ on the domain of 0 to 2π .

In the Solve aplet, enter the equation $2*\text{SIN}(X)+2=1$ in to the SYMB view. Change to PLOT SETUP and set the XRng to 0 to 2π (using the 3 key to enter pi) and the YRng to -3.1 to 3.2 . Enter an XTICK value of $\pi/4$. Now press PLOT. By plotting you can see where the solutions are. In this case, move the cross-hair close to the first solution (at about $X=3.6$) and then change to the NUM view. If you now press SOLVE, the calculator will find the nearest solution of $3.665\dots$

Change to the MODES screen and set the NUMBER FORMAT to 'Fraction 4'. Now change to the HOME view and type in X/π . The answer is $7/6$, so the required value must be 7π over 6 . Basically you are removing the π from the answer and giving the calculator the chance to tell you what the associated fraction was.

Now press PLOT, move near the other solution, press NUM and SOLVE, change back to HOME and press ENTER (to repeat the last calculation). This time the solution is $11\pi/6$.

The same method can be used in the Function aplet to find the exact value of intersections. Simply retrieve the value of the last intersection in HOME by typing 'Isect' and use the same method to isolate the fraction.

Warning! DON'T FORGET to change out of fraction mode when you finish.

