

Chapter 6 / Example 32

Trigonometric equations

Solve the equation $4\cos \theta - 3\sec \theta = 2\tan \theta$ for $-180^\circ \leq x \leq 180^\circ$.

Press **MENU** 5 **APPS** to display the equation entry screen.

Press **SHIFT** **MENU** (SETUP).

Scroll down using **▼** to Angle and change the setting to **F1** Deg.

Press **EXIT**.

```
Dual Screen :Off
Simul Graph :Off
Derivative  :Off
Background :None
Plot/LineCol:Green
Sketch Line :Norm
Angle       :Deg
Deg Rad Gra
```

Type $4\cos x - \frac{3}{\cos x}$ and press **EXE** to enter the first equation as Y1.

Type $2\tan x$ and press **EXE** to enter the second equation as Y2.

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

```
Graph Func :Y=
Y1=4cos x - 3/cos x [-]
Y2=2tan x [-]
Y3: [-]
Y4: [-]
Y5: [-]
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]
```

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

Set the axes to show $-180 \leq x \leq 180$ and set the scale to 30.

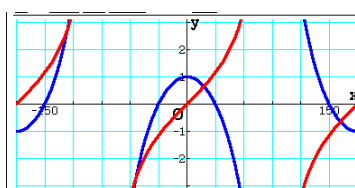
Leave the other items the same.

Press **EXIT** when you have finished.

```
View Window
Xmin : -180
max  : 180
scale: 30
dot  : 0.95238095
Ymin : -3.1
max  : 3.1
[INITIAL] [TRIG] [STANDARD] [V-MEM] [SQUARE]
```

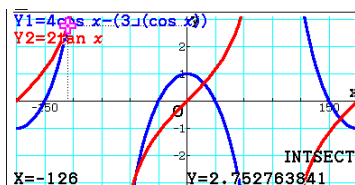
Press **F6** DRAW to display the graph screen.

The GDC displays the curves $Y1 = 4\cos x - \frac{3}{\cos x}$ and $Y2 = 2\tan x$ in the given domain.



To find the intersections press **F5** G-SOLVE and then press **F5** INTERSECT.

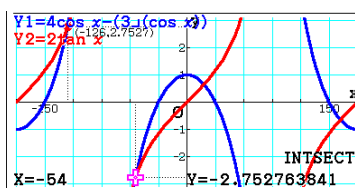
The GDC shows the first intersection at $(-126, 2.75)$.



Press **EXE** to display the coordinates.

Press **▶** to move to the next zero and press **EXE** to display its coordinates.

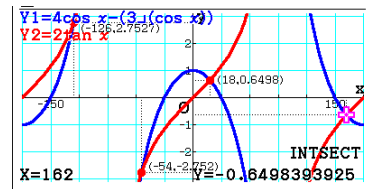
The GDC displays an intersection at $(-54, -2.75)$.



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Repeat for the other two intersections.

The GDC displays intersections at $(18, 0.650)$ and $(162, -0.650)$



Press **EXIT** to leave G-Solv mode and **F6** DRAW to display the graph screen again.

Therefore, the roots of the equation in the required range are -126° , -54° , 18° , 162° .

