Chapter 2 / **Example 11**

Domain, range and asymptotes

Use of a table to assist in identifying asymptotes to find the domain and range of a function.

Determine the domain and range of the rational function $y = \dfrac{1}{\sqrt{x+1}}$.

Confirm your answer graphically, and state the equations of any asymptotes.

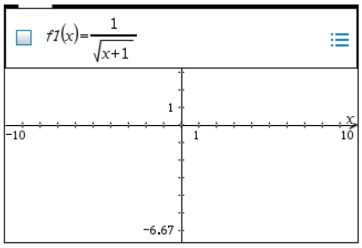
Open a new document and add a Graphs page.

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

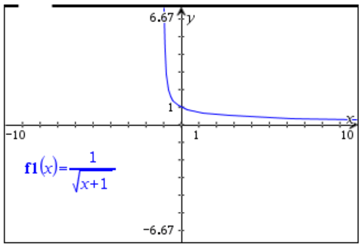
The default graph type is function, so '$f1(x)$=' is displayed.

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

Type $\dfrac{1}{\sqrt{x+1}}$, using ctrl ÷ ( ) to enter the rational function, and press enter.



The GDC displays $y = \dfrac{1}{\sqrt{x+1}}$ in the default window.



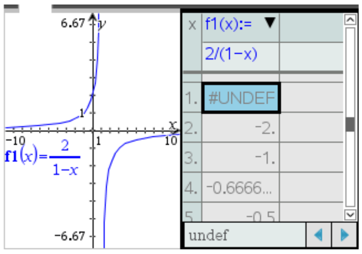
To view asymptotic behavior, it is helpful to use a table of values. Press ctrl T.

A table of values is displayed alongside the graph.

Scroll up the table using ▲ on the touchpad.

The table shows 'undef' by $x = -1$ and 'ERR' by $x < -1$.

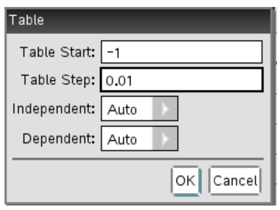
This suggests that $x = -1$ is a vertical asymptote.



To view behavior around the vertical asymptote, change the table view.

Press menu 2:Table | 5:Edit Table Settings… and set Table Start to −1 and Table Step to 0.01.

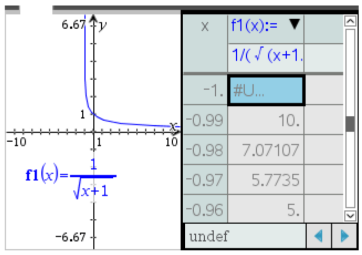
Press enter.



Chapter 2 / **Example 11**

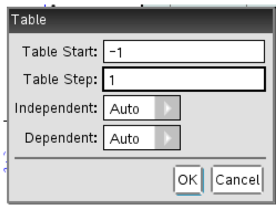
Domain, range and asymptotes

The values are increasing as x approaches −1, confirming that $x = -1$ is a vertical asymptote.



Press menu 2:Table | 5:Edit Table Settings... and change Table Step to 1.

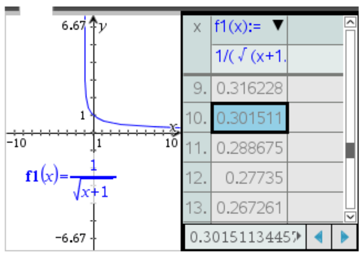
Press enter.

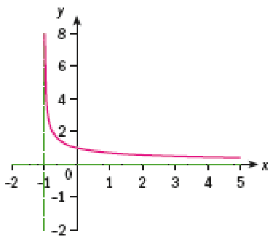


Scroll down the table using ▼ on the touchpad.

The values of $f1(x)$ are positive and approaching 0.

You can conclude that $y = 0$ is a horizontal asymptote.





Domain: $x \in \mathbb{R}, x > -1$

Range: $y \in \mathbb{R}, y > 0$