

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.

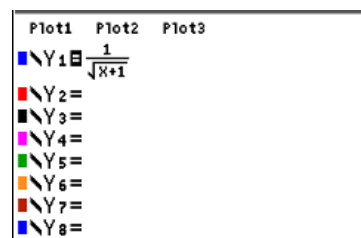
Determine the domain and range of the rational function $y = \frac{1}{\sqrt{x+1}}$.

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

Press $\boxed{\text{f1}}$ $\boxed{\text{y=}}$ to display the equation entry screen.

Press $\boxed{\text{ALPHA}}$ $\boxed{\text{f1}}$ 1:n/d to select the fraction template

Type $\frac{1}{\sqrt{x+1}}$ and press $\boxed{\text{enter}}$ to enter the equation as Y_1 .

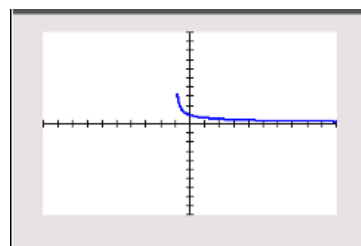


Press $\boxed{\text{f5}}$ $\boxed{\text{graph}}$ to display the graph screen

The GDC now displays the quadratic function:

$$Y_1 = \frac{1}{\sqrt{x+1}}$$

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



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

Press $\boxed{\text{mode}}$. Use the $\boxed{\leftarrow}$ $\boxed{\uparrow}$ $\boxed{\rightarrow}$ $\boxed{\downarrow}$ keys to place the cursor on GRAPH-TABLE in the Mode menu, and then press $\boxed{\text{enter}}$ to highlight it.

```
MATHPRINT CLASSIC
NORMAL SCI ENG
FLOAT 0 1 2 3 4 5 6 7 8 9
RADIAN DEGREE
FUNCTION PARAMETRIC POLAR SEQ
THICK DOT-THICK THIN DOT-THIN
SEQUENTIAL SIMUL
REAL a+bi re^(θi)
FULL HORIZONTAL GRAPH-TABLE
FRACTIONTYPE: n/d Unrd
ANSWERS: AUTO DEC FRAC-APPROX
GO TO 2ND FORMAT GRAPH: NO YES
STAT DIAGNOSTICS: OFF ON
STAT WIZARDS: ON OFF
SET CLOCK 11/10/18 10:06AM
```

Press $\boxed{\text{f5}}$ $\boxed{\text{graph}}$.

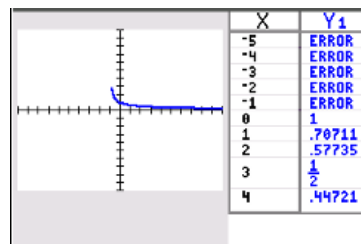
A table of values is displayed alongside the graph.

Press $\boxed{\text{2nd}}$ $\boxed{\text{f5}}$ $\boxed{\text{table}}$ to move the cursor into the table.

You can scroll through the table using $\boxed{\uparrow}$ and $\boxed{\downarrow}$ on the touchpad.

The table shows 'ERROR' by $x \leq -1$.

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



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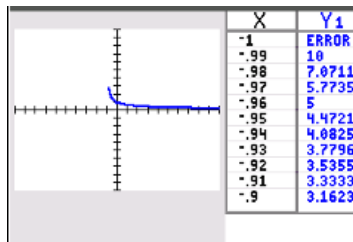
To view behavior around the vertical asymptote, change the table view.

Press **[2nd]** **[f2]** **[tblset]** and set TblStart to -1 and ΔTbl to 0.01 .

Press **[f5]** **[graph]**.

TABLE SETUP
TblStart=-1
 $\Delta\text{Tbl}=0.01$
Indpt: **Auto** Ask
Depnd: **Auto** Ask

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



Press **[2nd]** **[f2]** **[tblset]** and change ΔTbl to 1 .

Press **[f5]** **[graph]**.

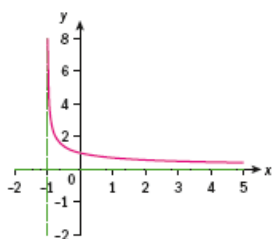
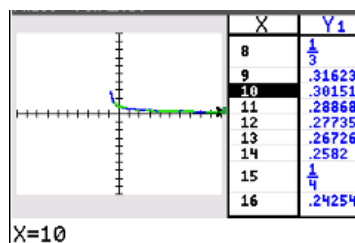
TABLE SETUP
TblStart=-1
 $\Delta\text{Tbl}=1$
Indpt: **Auto** Ask
Depnd: **Auto** Ask

Press **[2nd]** **[f5]** **[table]** to move the cursor into the table.

Scroll down the table using **[↓]**.

The values of Y_1 are positive and approaching 0 .

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



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

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