

## Chapter 4 / Example 3

# Asymptotes

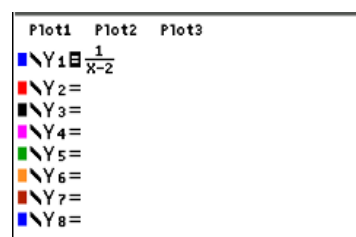
An alternative GDC approach to finding asymptotes of rational functions

- Sketch the function  $y = \frac{1}{x-2}$ . Show any asymptotes, not on the axes, as dotted lines.
- Write down the equations of the horizontal and vertical asymptotes.
- State the domain and range.

Press  $[f1]$   $[y=]$  to display the equation entry screen.

Press  $[ALPHA]$   $[f1]$  1:n/d to select the fraction template

Type  $\frac{1}{x-2}$  and press  $[enter]$  to enter the equation as  $Y_1$ .

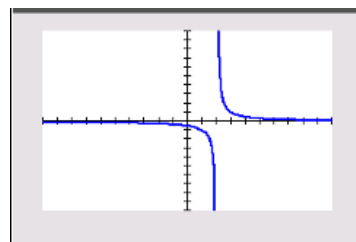


Press  $[f5]$   $[graph]$  to display the graph screen

The GDC now displays the quadratic function:

$$Y_1 = \frac{1}{x-2}$$

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  $[mode]$ . Use the  $[left]$   $[up]$   $[right]$   $[down]$  keys to place the cursor on GRAPH-TABLE in the Mode menu, and then press  $[enter]$  to highlight it.



Press  $[f5]$   $[graph]$ .

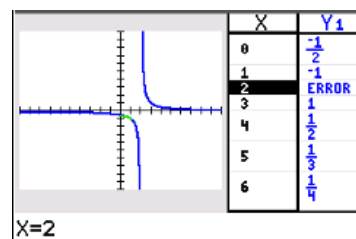
A table of values is displayed alongside the graph.

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

You can scroll through the table using  $[up]$  and  $[down]$  on the touchpad.

The table shows 'ERROR' by  $x = 2$ .

This shows that  $x = 2$  is a vertical asymptote.

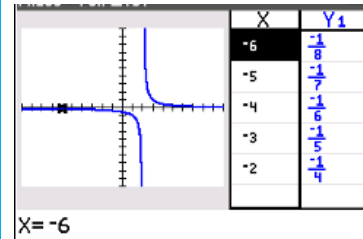


## Chapter 4 / Example 3

# Asymptotes

Scroll up the table using  $\blacktriangle$ .

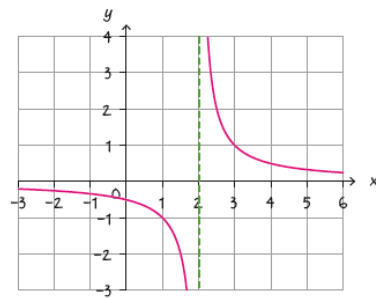
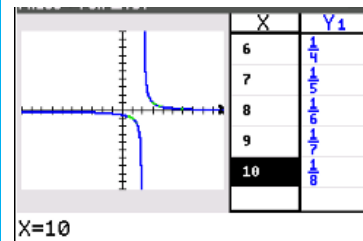
The values of  $Y_1$  are negative and approaching 0.



Scroll down the table using  $\blacktriangledown$ .

The values of  $Y_1$  are positive and approaching 0.

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



Domain:  $x \in \mathbb{R}, x \neq 2$

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