

Chapter 4 / **Example 1****Finding a limit with a graph and table**


Using your GDC,

a Sketch the graph of $y = \frac{3^x - 1}{x}, x \neq 0$

b Find $\lim_{x \rightarrow 0^-} \frac{3^x - 1}{x}$ and $\lim_{x \rightarrow 0^+} \frac{3^x - 1}{x}$ numerically, giving your answer to 1 decimal place.

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

Type $\frac{3^x - 1}{x}$ and press **EXE** to enter the equation as Y1.

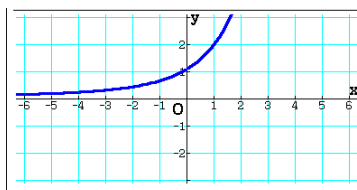
Use the fraction template  to enter the fraction.

Graph Func : Y=
Y1: $\frac{3^x - 1}{x}$ [—]
Y2: [—]
Y3: [—]
Y4: [—]
Y5: [—]
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]



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

The GDC now displays the functions $Y1 = \frac{3^x - 1}{x}$

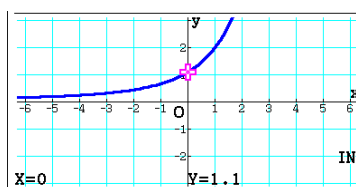
The default axes are $-6.3 \leq x \leq 6.3$ and $-3.1 \leq y \leq 3.1$.



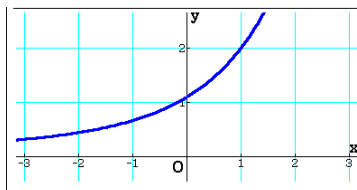
Press **F2** Zoom **F3** IN.

Select the center position using   so that it is close to the y-intercept.

Press **EXE**.



Even after zooming in the curve appears to be continuous at $x = 0$.



To get a better idea of the behavior of the function close to $x = 0$.

Press **MENU** 7 **TABLE**. Press **F5** SET and change the settings so that the table starts from -0.08 and ends at 0.08 with a step of 0.01 .

Press **EXIT**.

Table Setting
X
Start: -0.08
End : 0.08
Step : 0.01

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Press **F6** TABLE.

A table of values is displayed.

You can scroll through the table using **▲** and **▼**.

When $x = -0.01$, $y = 1.092599...$

When $x = 0.01$, $y = 1.104669...$

There is an error at $x = 0$.

From the table, since the limits from both the left and right are the same to 1 d.p., $\lim_{x \rightarrow 0^+} \frac{3^x - 1}{x} \approx 1.1$.

$Y1 = (3^x - 1) \div x$

X	Y1
-0.02	1.0866
-0.01	1.0925
0	ERROR
0.01	1.1046

1.092599583

FORMULA DELETE ROW EDIT GRAPH-CON GRAPH-PLT