

Chapter 5 / Example 1

Limit of a function

Use your GDC to help you answer parts a and b.

a Sketch the graph of $y = \frac{x^2 - 9}{x - 3}$, $x \neq 3$

b Find $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$ numerically.

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

Press **□** to open the fraction template

Type $\frac{x^2 - 9}{x - 3}$ and press **EXE** to enter the equation as Y1.

Graph Func : Y=

Y1: $\frac{x^2 - 9}{x - 3}$ [—]

Y2: [—]

Y3: [—]

Y4: [—]

Y5: [—]

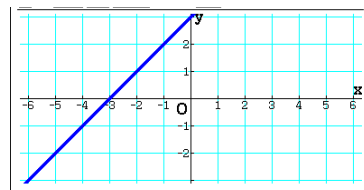
[SELECT] [DELETE] [TYPE] [TOOL] [MODIFY] [DRAW]

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

The GDC now displays the function:

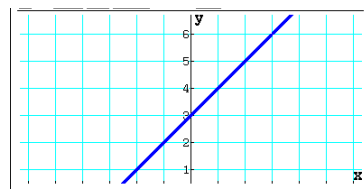
$$Y_1 = \frac{x^2 - 9}{x - 3}$$

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



Press **▲** a few times until you can see 6 on the y-axis.

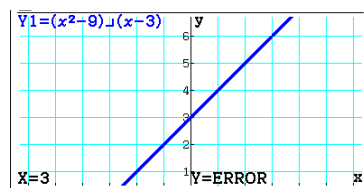
If you look closely at the line, you will notice that there is a very slight gap in it.



Press **F1** Trace

Use **▶** move along the line towards the point where $x = 3$

The GDC shows values of x and y as you move along the line but when $x = 3$ there is an error. This is because the rational function is not defined at $x = 3$.



To see the behavior around the point where $x = 3$ it is helpful to use a table of values.

Press **MENU** 7 **TABLE**. Press **F5** SET and change the settings so that the table starts from -5 and ends at 5 .

Press **EXIT**.

Table Setting

X

Start: -5

End : 5

Step : 1

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Press **F6** TABLE.

A table of values is displayed. You can scroll through the table using **▲** and **▼**.

The table shows 'ERROR' by $x = 3$.

| X | Y1 |
|---|-------|
| 1 | 4 |
| 2 | 5 |
| 3 | ERROR |
| 4 | 7 |

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Press **EXIT** and press **F5** SET

Edit the table settings so that the table starts at 2.8 with steps of 0.1.

Press **EXIT** and press **F6** TABLE.

| | |
|---------------|-----|
| Table Setting | |
| X | |
| Start: | 2.8 |
| End : | 5 |
| Step : | 0.1 |

From the table of values, since the limits from both the left and right are the same to the nearest whole number, $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3} = 6$.

| X | Y1 |
|-----|-------|
| 2.9 | 5.9 |
| 3 | ERROR |
| 3.1 | 6.1 |
| 3.2 | 6.2 |

3.2

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