

Chapter 10 / **Example 9**

Use $\frac{dy}{dx} = 0$ to find a maximum or minimum point

Consider the derivative function $\frac{dy}{dx} = 1 - \frac{1}{x^2}, x \neq 0$.

- Plot the curve on a GDC.
- Find the values of x at which $\frac{dy}{dx} = 0$.
- State whether these points represent local maximum or minimum points on the curve for y , justifying your answer.

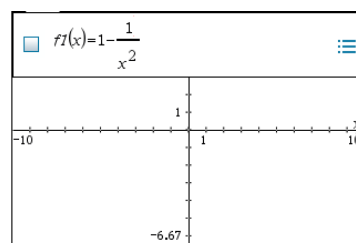
Open a new document and add a Graphs page.

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

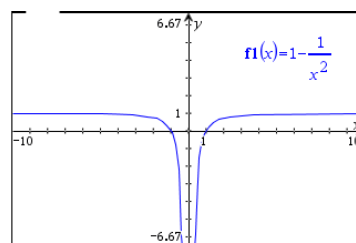
The default graph type is function, so ' $f1(x)=$ ' is displayed.

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

Type $1 - \frac{1}{x^2}$ using the fraction template $\boxed{\text{ctrl}} \boxed{\div} \left(\boxed{\frac{\square}{\square}}\right)$ and press $\boxed{\text{enter}}$.



The GDC displays the graph $f1(x) = 1 - \frac{1}{x^2}$ with the default axes.

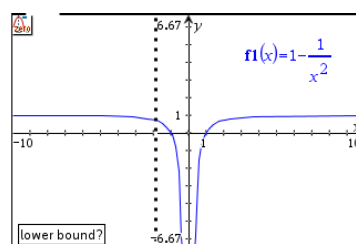


To find the zeros press $\boxed{\text{menu}} \boxed{6:\text{Analyse Graph}} \boxed{1:\text{Zero}}$

You will need to give the lower and upper bounds of the region that includes the zero.

The GDC shows a line and asks you to set the lower bound. Move the line using the touchpad and choose a position to the left of the zero.

Click the touchpad.



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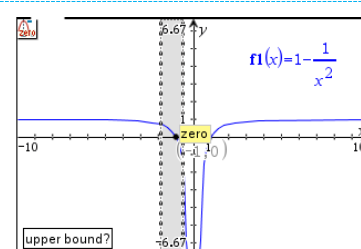
Use $\frac{dy}{dx} = 0$ to find a maximum or minimum point

The GDC shows another line and asks you to set the upper bound.

Use the touchpad to move the line so that the region between the lower and upper bounds contains the zero.

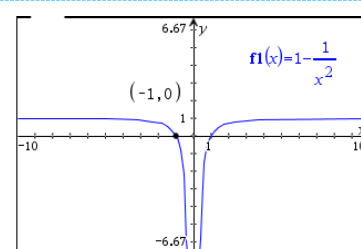
When the region contains the zero, the calculator will display the word 'zero' in a box.

Click the touchpad.



The GDC displays a zero at $-1, 0$.

$x = -1$ will be a maximum point as the gradient changes from positive to negative.



Repeat for the second zero.

The GDC displays a zero at $1, 0$.

$x = 1$ will be a minimum point as the gradient changes from negative to positive.

