

A straight line to which a given curve eventually gets as close as we like, and stays close, is called an *asymptote* to the curve.

For example:

- For the graph of  $y = \frac{1}{x}$ , the  $x$ -axis and  $y$ -axis are both asymptotes: the curve gets as close as we like to the  $x$ -axis as  $x$  tends towards  $\infty$  or  $-\infty$ , and as close to the  $y$ -axis as we like as  $x$  tends to zero.
- For the graph of  $y = \ln(x)$  (where  $x > 0$ ), the  $y$ -axis is an asymptote: the curve gets as close as we like to it as  $x$  tends towards zero.
- For the graph of  $y = 2$ , the line  $y = 2$  is an asymptote: the curve  $y = 2$  (actually a straight line) is as close as we like to itself as  $x$  tends towards  $\infty$ .
- For the graph of  $y = \frac{\sin x}{x}$ , the  $x$ -axis is an asymptote: as  $x$  tends towards  $\infty$  or  $-\infty$ , even though the graph crosses the  $x$ -axis infinitely often, the curve gets as close as we like to the  $x$ -axis and stays close.

