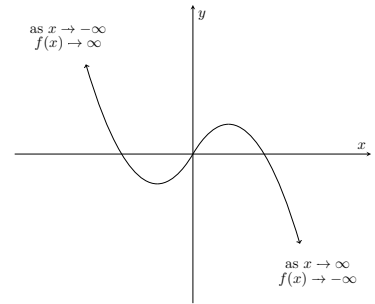**LIMITS**: A limit is the value that a function **approaches** as the input approaches some value. Limits help us sketch graphs as it describes how a function **behaves near a point.**

X approaches zero – factorise and cancel

X approaches a constant – factorise and cancel

$$\lim_{x\to2}\frac{x^2-4}{x-2}=\lim_{x\to2}\frac{(x+2)(x-2)}{x-2}$$

$$=\lim_{x\to2}(x+2)$$

$$=2+2=4$$

X approaches infinity – divide by the highest power of x in the denominator

$$\lim_{x\to\infty}\frac{x}{x^2+1}=\lim_{x\to\infty}\frac{\frac{x}{x^2}}{\frac{x^2}{x^2}+\frac{1}{x^2}}$$

Note: $\lim(x\to\infty)\dfrac{1}{x}=0$

as $x\to-\infty$
$f(x)\to\infty$

as $x\to\infty$
$f(x)\to-\infty$

9.5 WORKED EXAMPLE

Solve:

$$\lim_{x\to2}\frac{x^2-3x+2}{x^2-2x}$$

9.6 WORKED EXAMPLE

Solve:

$$\lim_{x\to25}\frac{\sqrt{x}-5}{x-25}$$

Hint: Rationalise.