C3

1 Algebraic fractions

Algebraic fractions can be simplified by equating the fraction to an equation made of constants

1.1 Example

$$\frac{x^3+2x^2-6x+1}{x-1} \equiv Ax^2+Bx+C+\frac{D}{x-1}$$

$$x^3+2x^2-6x+1 \equiv (x-1)(Ax^2+Bx+C)+D$$

$$x^3+2x^2-6x+1 \equiv Ax^3+(B-A)x^2+(C-B)x+(D-C)1$$

Term	Calculation	Final Value
x^3 coefficient	$1 = A$	$\mathbf{A = 1}$
x^2 coefficient	$2 = B - A$	$\mathbf{B = 3}$
x coefficient	$-6 = C - B$	$\mathbf{C = -3}$
Constant term	$1 = D - C$	$\mathbf{D = -2}$

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

2 Functions

2.1 Definitions

Domain - The input to a function
Range - The output from a function

2.2 Function mapping

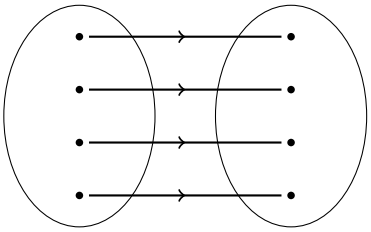


Figure 1: One-to-one function

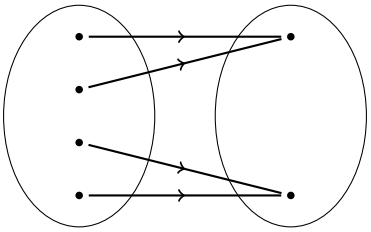


Figure 2: Many-to-one function

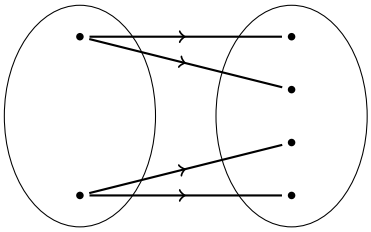
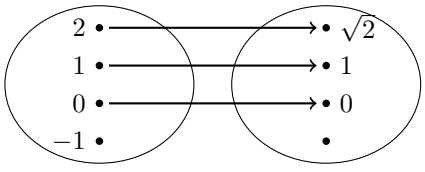


Figure 3: Not a function

A function is a mapping so that every element of the domain maps to exactly one element of the range

2.2.1 Changing non functions to functions

Some non functions can be changed to functions by restricting the domain
For example for $f(x) = \sqrt{x}$ where $x \in \mathbb{R}$ all positive values get mapped, however negative numbers don't, see below:



This means that the domain must be restricted to $x \geqslant 0$