

Ratings encoding

In the table below, each row represents a user's ratings of movies: ✓ (check) indicates the person liked the movie, ✕ (x) that they didn't, and • (dot) that they didn't rate it one way or another (neutral rating or didn't watch).

Person	Fyre	Frozen II	Picard	Ratings written as a 3-tuple
P_1	✕	•	✓	
P_2	✓	✓	✕	
P_3	✓	✓	✓	
P_4	•	✕	✓	

Definitions

Term	Notation Example(s)	We say in English
n -tuple	(x_1, x_2, x_3) $(3, 4)$	The 3-tuple of x_1 , x_2 , and x_3 The 2-tuple or ordered pair of 3 and 4
sequence	x_1, \dots, x_n x_1, \dots, x_n where $n = 0$ x_1, \dots, x_n where $n = 1$ x_1, \dots, x_n where $n = 2$ x_1, x_2	A sequence x_1 to x_n An empty sequence A sequence containing just x_1 A sequence containing just x_1 and x_2 in order A sequence containing just x_1 and x_2 in order
set		Unordered collection of objects. The set of ...
all integers	\mathbb{Z}	The (set of all) integers (whole numbers including negatives, zero, and positives)
all positive integers	\mathbb{Z}^+	The (set of all) strictly positive integers
all natural numbers	\mathbb{N}	The (set of all) natural numbers. Note: we use the convention that 0 is a natural number.
roster method	$\{43, 7, 9\}$ $\{9, \mathbb{N}\}$	The set whose elements are 43, 7, and 9 The set whose elements are 9 and \mathbb{N}
set builder notation	$\{x \in \mathbb{Z} \mid x > 0\}$ $\{3x \mid x \in \mathbb{Z}\}$	The set of all x from the integers such that x is greater than 0 The set of all integer multiples of 3. Note: we use the convention that writing two numbers next to each other means multiplication.
function definition	$f(x) = x + 4$	Define f of x to be $x + 4$
function application	$f(7)$ $f(z)$ $f(g(z))$	f of 7 or f applied to 7 or the image of 7 under f f of z or f applied to z or the image of z under f f of g of z or f applied to the result of g applied to z
absolute value	$ -3 $	The absolute value of -3
square root	$\sqrt{9}$	The non-negative square root of 9
summation notation	$\sum_{i=1}^n i$ $\sum_{i=1}^n i^2 - 1$	The sum of the integers from 1 to n , inclusive The sum of $i^2 - 1$ (i squared minus 1) for each i from 1 to n , inclusive
quotient, integer division	$n \text{ div } m$	The (integer) quotient upon dividing n by m ; informally: divide and then drop the fractional part
modulo, remainder	$n \text{ mod } m$	The remainder upon dividing n by m

Defining sets

To define a set using **roster method**, explicitly list its elements. That is, start with $\{$ then list elements of the set separated by commas and close with $\}$.

To define a set using **set builder definition**, either form “The set of all x from the universe U such that x is ...” by writing

$$\{x \in U \mid \dots x \dots\}$$

or form “the collection of all outputs of some operation when the input ranges over the universe U ” by writing

$$\{\dots x \dots \mid x \in U\}$$

We use the symbol \in as “is an element of” to indicate membership in a set.

Example sets: For each of the following, identify whether it’s defined using the roster method or set builder notation.

$$\{-1, 1\}$$

$$\{0, 0\}$$

$$\{-1, 0, 1\}$$

$$\{(x, x, x) \mid x \in \{-1, 0, 1\}\}$$

$$\emptyset$$

$$\mathbb{N} = \{x \in \mathbb{Z} \mid x \geq 0\}$$

$$\mathbb{Z}^+ = \{x \in \mathbb{Z} \mid x > 0\}$$

$$\{\mathbf{A}, \mathbf{C}, \mathbf{U}, \mathbf{G}\}$$

$$\{\mathbf{AUG}, \mathbf{UAG}, \mathbf{UGA}, \mathbf{UAA}\}$$

Data types

Term	Examples: (add additional examples from class)
set unordered collection of elements <i>repetition doesn't matter</i> <i>Equal means agree on membership of all elements</i>	$7 \in \{43, 7, 9\}$ $2 \notin \{43, 7, 9\}$
<i>n</i>-tuple ordered sequence of elements with <i>n</i> “slots” <i>repetition matters, fixed length</i> <i>Equal means corresponding components equal</i>	
string ordered finite sequence of elements each from specified set <i>repetition matters, arbitrary finite length</i> <i>Equal means same length and corresponding characters equal</i>	