

# 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). Can encode these ratings numerically with 1 for ✓ (check), −1 for ✗ (x), and 0 for • (dot).

Person	Dune	Oppenheimer	Barbie	Nimona	Ratings written as a 4-tuple
$P_1$	✗	•	✓		
$P_2$	✓	✓	✗		
$P_3$	✓	✓	✓		
$P_4$	•	✗	✓		
$You$					

# Defining sets

*To define 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

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

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

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

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 and give an example element.

Can we infer the data type of the example element from the notation?

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

$$\{0, 0\}$$

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

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

$$\{\}$$

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

$$\{x \in \mathbb{Z} \mid x > 0\}$$

$$\{\smile, \odot\}$$

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

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

## Defining functions ratings

Recall our representation of Netflix users' ratings of movies as  $n$ -tuples, where  $n$  is the number of movies in the database. Each component of the  $n$ -tuple is  $-1$  (didn't like the movie),  $0$  (neutral rating or didn't watch the movie), or  $1$  (liked the movie).

Consider the ratings  $P_1 = (-1, 0, 1, 0)$ ,  $P_2 = (1, 1, -1, 0)$ ,  $P_3 = (1, 1, 1, 0)$ ,  $P_4 = (0, -1, 1, 0)$

Which of  $P_1$ ,  $P_2$ ,  $P_3$  has movie preferences most similar to  $P_4$ ?

One approach to answer this question: use **functions** to quantify difference among user preferences.

For example, consider the function  $d_0 : \{-1, 0, 1\}^4 \times \{-1, 0, 1\}^4 \rightarrow \mathbb{R}$  given by

$$d_0((x_1, x_2, x_3, x_4), (y_1, y_2, y_3, y_4)) = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + (x_3 - y_3)^2 + (x_4 - y_4)^2}$$