Definitions

Term	Notation Example(s)	We say in English
sequence	x_1, \ldots, x_n	A sequence x_1 to x_n
summation	x_1, \dots, x_n $\sum_{i=1}^n x_i \text{ or } \sum_{i=1}^n x_i$	The sum of the terms of the sequence x_1 to x_n
all reals	\mathbb{R}	The (set of all) real numbers (numbers on the number line)
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	N	The (set of all) natural numbers. Note : we use the convention that 0 is a natural number.
piecewise rule definition function application	$f(x) = \begin{cases} x & \text{if } x \ge 0 \\ -x & \text{if } x < 0 \end{cases}$ $f(7)$ $f(z)$ $f(g(z))$	Define f of x to be x when x is nonnegative and to be $-x$ when x is negative f of f or f applied to f or the image of f under f of f or f applied to f or the image of f under f of f of f of f of f of f applied to the result of f applied to f
absolute value square root	$\begin{array}{c} -3 \\ \sqrt{9} \end{array}$	The absolute value of -3 The non-negative square root of 9

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

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 define distance between user preferences.

For example, consider the function d_0 : given by

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

Extra example: A new movie is released, and P_1 and P_2 watch it before P_3 , and give it ratings; P_1 gives \checkmark and P_2 gives \checkmark . Should this movie be recommended to P_3 ? Why or why not?

Extra example: Define a new function that could be used to compare the 4-tuples of ratings encoding movie preferences now that there are four movies in the database.