Decision problems

A **decision problem** has a yes/no answer

Different, but related to **optimization problem**, where trying to maximize/minimize a value

Any decision problem Q can be viewed as language: $L = \{x \in \{0,1\}^* : Q(x) = 1\}$

Q **decides** L: every string in L accepted by Q, every string not in L rejected

Example of a decision problem

PATH = {⟨*G, u, v, k*⟩ : *G* = (*V, E*) is an undirected graph, *u,v* ∈ *V*, *k* ≥ 0 is an integer, and ∃ a path from *u* to *v* in *G* with ≤ *k* edges}

Encoding of input ⟨*G, u, v, k*⟩ is important! We express running times as function of input size

Corresponding optimization problem is SHORTEST-PATH