Cantor’s Diagonal argument

All sequence of 0’s and 1’s is uncountably infinite.

Suppose (for contradiction) the set is countably infinite

=> we can list the elements

s1 = **0**110010

s2 = 1**0**11101

s3 = 00**0**0010

s4 = 111**1**111

s = 1110...

change digit on diagonal

By assumption s is on the list somewhere

s = sn

however by construction of s, the nth term of s is different to the nth term of sn.

=> s != sn

conclusion: my list doesnt contain every sequence of 0’s and 1’s

therefore the sequence of 0s and 1s is uncountably infinite

by changing a digit of each element of the set you generate a new element not in the set, therefore it is not in the set.

Turing machine is a 7-tuple (S, A, A~, t, i, Sacc, Srej)

S = set of states

A = input alphabet

A~ = tape alphabet (blank e A~, A ⊆ A~)

t = transition map S X A~ -> S X A~ X {L, R}

t(s,a) = (s’, a’, L/R)

i = initial state

Sacc = accept state

Srej = Reject state

Sacc != Srej