Class Exercise

Prove the set S of infinite length binary strings is uncountable.

Hint: Recall the proof that $\mathbb{P}(\mathbb{N})$ is uncountable.

Suppose S is countable, and then write its matrix representation $M[i,j]$ where the ith row denotes the ith string in S, and $M[i,j]$ is the value (0 or 1) of the jth character in that string.