5.20 Prove there exists a undecidable subset of $\{1\}^*$

For any n, let s_n be a string of $n-1$ 1's.

The number of TM's are countable, so if $\{1\}^*$ is uncountable, it is undecidable

We can associate any subset A of $\{1\}^*$ with an infinite binary string the j^{th} member of the string is a 1, if s_j is in A and would be 0 otherwise.

Each subset A would create it's own unique infinite binary string.

the number of unique infinite binary strings is infinite, therefore uncountable.

Since the number of subsets is uncountable there must be some subset that is unrecognizable.

a unrecognizable subset is undecidable