

? 's re. TM material

1)) What is the Church-Turing Thesis?

a)

X) Give a total binary valued function that is not computable.

b)

) Is there an unrestricted grammar generating the following language:

c)

$$NSA = \{e(T) : T \text{ does not accept } e(T)\} ?$$

Why or why not?

) Is the following problem decidable: Given an unrestricted grammar G and a word w , does G generate w ? Give a two-sentence reason for your answer.

d)

- e) Give a T.a. language that is not T.d.
- f) Give a language that is not T.a.
- g) Show that T.a. langs are closed under finite union.
- h) Are T.a. langs. closed under infinite union?
Prove your answer
- i) What does the universal TM do?
- j) Give a statement of the Halting problem
- k) What is the language associated with the Halting problem

2 Show that the following function is not computable:

$f(m, n)$ is the maximum number of steps any halting computation or crashing computation can take of a Turing machine with m states on an input of length n .

Hint: Show that if f was computable then you could use it to decide the Halting Problem.

~~3~~ 3) Show that the set of infinite binary sequences is uncountably infinite.

4) Show that the Halting Problem is undecidable.