Math 29: Computability Theory

Spring 2024

PSET 4 - 04/26/2024

Prof. Miller Student: Amittai Siavava

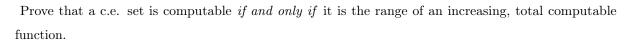
## Problem 1.

Does Lemma 1 from the Noncomputability lecture hold if we remove the word "total"? That is, si f partial computable if and only if its graph is a computable set? Justify your answer.

## Problem 2.

Recall that  $W_e$  is  $\mathbf{dom}(\varphi_e)$ , and that X is c.e. if  $X=W_e$  for some e. Show that it is equivalent to define the c.e. sets as those that are either finite or the range of an increasing, total, computable, injective function  $f: \mathbb{N} \to \mathbb{N}$ .

# Problem 3.



# Problem 4.

Prove that K (the halting set) is  $\operatorname{\operatorname{{\it not}}}$  an index set.

# Problem 5.

Show that if P is productive then P contains the infinite c.e. set.