

## 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, is  $f$  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  $f : \mathbb{N} \rightarrow \mathbb{N}$ .

**Problem 3.**

Prove that a c.e. set is computable *if and only if* it is the range of an increasing, total computable function.

**Problem 4.**

Prove that  $K$  (the halting set) is *not* an index set.

**Problem 5.**

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

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