

Name: _____

Pid: _____

1. (10 points) Prove that there is an undecidable set W such that the sets $\{x : (n, x) \in W\}$ and $\{x : (x, n) \in W\}$ are decidable for all $n \in \mathbb{N}$

2. (10 points) Let $U : \mathbb{N}^2 \rightarrow \mathbb{N}$ be a Gödel universal function. Prove that there is $p \in \mathbb{N}$ such that

$$U(p, x) = \begin{cases} 1 & \text{if } x = p^2 \\ 0 & \text{otherwise} \end{cases}.$$