Name:

PID:

1. Prove that $\text{Accept}_1$ defined by

$$\text{Accept}_1(M', w) \iff \text{M}'(w) \text{ accepts}$$

is undecidable.

2. Give a many-one reduction from $\text{Halt}_0$ to $\text{Halt}_1$.

Let $w \rightarrow <w, \varepsilon>$. Where $w \in \text{Halt}_0 \rightarrow <w, \varepsilon> \in \text{Halt}_1$.

Both mean $M'(\tilde{M})$ halts

where $w = \tilde{M}$. 

Want a function $f$ (many-one reduction):

$$f: M' \rightarrow N'$$

such $M'$ halts if $N'$ accepts.

So $f$ is a many-one reduction from $\text{Halt}_1$ to $\text{Accept}_1$.

$N'$ is formed from $M'$ by replacing any instruction in $M$ that rejects, by an instruction that accepts and halts.

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**Universal Algorithm:**

If either of them accept, then accept.

**Assumption:** $X$ decides $\text{Accept}_1$.

**Input:** $M'$, $w$

**Algorithm**

Run $X(M', w)$ and $X(\tilde{M}, w)$

where $\tilde{M}$ is same as $M$

but with "Accept" & "Reject" swapped.