

## HW4

### 1

In order to prove this, we must prove there exists a function  $f$  such that  $x \in A_{TM} \leftrightarrow f(x) \in L_{343}$

Remember  $x = \langle M, w \rangle$  and  $f(x) = \langle M' \rangle$

$M'$  on input  $y$ :

- Run  $M$  on  $w$
- If  $M$  accepts:
  - Check if  $y$  is equal to “CSDS 343 is fun”
  - If yes  $\rightarrow$  Accept
  - Else
    - \* Check if  $y$  is equal to “MATH 343 is fun”
    - \* If yes  $\rightarrow$  Accept
    - \* Else  $\rightarrow$  Reject
- If  $M$  rejects:
  - $M'$  rejects

### 2

### 3

**A Prove**  $A_{TM} \leq_M L_{add}$

In order to prove this, we must prove there exists a function  $f$  such that  $x \in A_{TM} \leftrightarrow f(x) \in L_{add}$

Remember  $x = \langle M, w \rangle$  and  $f(x) = \langle M' \rangle$

$M'$  on input  $y$ :

- Run  $M$  on  $w$
- If  $M$  accepts:
  - Run
- If  $M$  rejects:
  - $M'$  rejects

**B Prove**  $A_{TM}^- \leq_M L_{add}$

In order to prove this, we must prove there exists a function  $f$  such that  $x \in A_{TM}^- \leftrightarrow f(x) \in L_{add}$

Remember  $x = \langle M, w \rangle$  and  $f(x) = \langle M' \rangle$

$M'$  on input  $y$ :

- Run  $M$  on  $w$
- If  $M$  accepts:
  - Run
- If  $M$  rejects:
  - $M'$  rejects