## COMP 212: Functional Programming, Spring 2025

## Homework 03

Name:			
Wes Email:			

Question	Points	Score
1	21	
Total:	21	

If possible, please type/write your answers on this sheet and upload a copy of the PDF to your google drive handin folder. Otherwise, please write the answers in some sort of word processor and upload a PDF. Please name the file hw03-written.pdf.

See the homework handout for descriptions of the problems.

## 1. Zip Proof

(10) (a) Prove the following about your code:

Theorem 1. For all 1 : (int \* string) list,  $zip(unzip\ l) \cong l$ .

Solution: The proof is by structural induction on 1.  Case for []
To show:
Proof:

Solution: Case for x::xs Inductive hypothesis:
To show:
Proof:

(5) (b) Prove or disprove:

Theorem 2. For all 11 : int list and 12 : string list,

 $unzip(zip\ (l1,l2))\cong (l1,l2)$ 

Solution:	

## (5) (c) NON-COLLABORATIVE CHALLENGE PROBLEM Prove

Theorem 3. For natural number values n, inverse\_adjacent(n) = n/n+1.

Solution: The proof is by induction on n.  Case for 0
To show:
Proof:

Case for $1 + k$ Inductive hypothesis:
inductive hypothesis.
To show:
Proof:

(1) (d) Compare show(inverse\_adjacent 200) with show(200.0/201.0). Explain why

what you see does not match the theorem you proved in the previous task.

Solution:	