
COMP 212 : Functional Programming, Fall 2022

Homework 03

Name: _____

Wes Email: _____

Question	Points	Score
1	20	
Total:	20	

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 $l : (\text{int} * \text{string}) \text{ list}$, $\text{zip}(\text{unzip } l) \cong l$.*

Solution: The proof is by structural induction on l .

Case for $[]$

To show:

Proof:

Solution: Case for $x :: xs$

Inductive hypothesis:

To show:

Proof:

(5) (b) Prove or disprove:

Theorem 2. For all $l1 : \text{int list}$ and $l2 : \text{string list}$,

$$\text{unzip}(\text{zip } (l1, l2)) \cong (l1, l2)$$

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:

To show:

Proof: