Programming Languages Concepts
Final Exam

1. The `zip(l1 : [Nat], l2:[Nat]) -> [[Nat]]` function takes two lists and pairs each element of each list together into a list of two elements. For example,

   - ‘`zip([1,2],[3,4]) = [[1,3],[2,4]]`‘
   - ‘`zip([1,2],[3,4,5]) = [[1,3],[2,4]]`‘
   - ‘`zip([1,2,5],[3,4]) = [[1,3],[2,4]]`‘
   - ‘`zip([1,2],[]) = []`‘
   - ‘`zip([],[3,4]) = []`‘

   Define `zip` in MiniSwift using the `cons` syntax for lists and `match`.

2. Read about lists in the Swift documentation here. Define `zip` in Swift.

3. Type check your solution from 1. That is, derive
   $\emptyset \vdash \mathsf{zip}(l1 : [\mathsf{Nat}], l2 : [\mathsf{Nat}]) \rightarrow [[\mathsf{Nat}]]\{\ldots\}$