CS115 – Lab 3: Working with Lists

Spring 2020

Question 1: Powers of 2

Exercise

Write a function `(powers2 start count)` that returns a `(listof Int)` containing `count` powers of two where the first value is 2^{start}.

```
(powers2 3 4) => (list 8 16 32 64)
```

Hint

Read the documentation on `expt`.

Exercise

Using `powers2` as a helper, write a function `(total-powers start count)` that returns the sum of the `count` powers of two where the first value is 2^{start}.

```
(total-powers 3 4) => 120
```

Question 2: Countdown

Exercise

Write a funtion `(countdown n)` that returns a `Str` depicting a countdown from `n`, with `"... "` between the values, and ending with `"blastoff!"`.

```
(countdown 5) => "5... 4... 3... 2... 1... blastoff!"
```

Hint

You will need to use `range`, `map`, and `foldr` on this question. You will need to write a helper function to use with `map`.

Question 3: Multiply by position

Exercise

Write a function `(multipos L)` that consumes a `(listof Int)`. It returns a `(listof Int)` where the first item has been multiplied by 1, the second by 2, the third by 3, and so on.

```
(multipos (list 1 1 1)) => (list 1 2 3)
(multipos (list 2 3 5 7)) => (list 2 6 15 28)
```

Hint

You can use map with multiple lists, then it will take one item from each list and combine them with the function.
For example,
```
(map + (list 1 2 3) (list 4 5 11))
=> (list (+ 1 4) (+ 2 5) (+ 3 11))
=> (list 5 7 14)
```
See if you can use this idea to solve the lab question!

Question 4: Length to power

Write a function `(l2p L)` that consumes a `(listof Any)`. It returns 2 to the power of the length of the list.

```
(l2p (list 17 42 "foobar")) => 8
(l2p '()) => 1
```

Do not use `expt` or `length` on this question.

Use `foldr`.