Name:

CS 421 — State Activity

Mattox Beckman

Challenge

Example 1) Can you write a `counter` function (or function producer) without using objects and without using global variables?

Two hints: python supports HOFs and nested function declarations. To access an outer scoped variable, use the `nonlocal` keyword. Here is a convoluted "increment" function that shows some of the features you will need.

```
def inc(x):
    i = x
    def doit():
        nonlocal i
        i = i + 1

    doit()
    return i
```

Problem 1) Consider this Python code.

```
class Delay:
    def __init__(self,action):
        self.action = action
        self.status = 0

    def report(x):
        print("Thunk executed: {}".format(x))
        return x

    def force(self):
        if self.status == 2:
            return self.value
        elif self.status == 0:
            self.status = 1
            self.value = Delay.report(self.action())
            self.status = 2
            return self.value
        else:
            return Exception("It broke!")
```

- Review this code with a partner. Can you figure out how to use it?
- What is the purpose of `self.status = 1`?

Consider this function and list definition.

```
def lazyTake(n,x):
    if x==() or n<1:
        return ()
    else:
        return (x[0],lazyTake(n-1,x[1].force()))

l1 = (2,Delay(lambda: (3, Delay(lambda: (5, Delay(lambda: ()))))))
```

Problem 2) Can you write `lazyTail`, `lazyMap`, and `lazyZipWith`?

Problem 3) Use these functions to make the infinite list of natural numbers and Fibonacci numbers.