CS 61A Structure and Interpretation of Computer Programs
Spring 2017

Discussion Quiz 10 Solutions

1. **(5 points) Extreme Stream Supreme (translated from Scheme)**

   What are the first four values of the stream `s`?

```
def sweet(dreams):
    return Stream(Link(dreams), lambda: sweet(Link(dreams)))

def mix(tape):
    pre = match(lambda x: x.rest, tape.rest)
    temp = pre
    while temp.rest is not Link.empty:
        temp = temp.rest
    temp.rest = Link(tape.first.rest)
    return Stream(tape.first.first, lambda: mix(pre))

def match(dot, com):
    if com is Link.empty:
        return com
    return Link(dot(com.first), match(dot, com.rest))

s = mix(match(sweet, Link(1, Link(2, Link(3)))))
```

```
Link(1), Link(Link(2)), Link(Link(Link(3))), Link(Link(Link(Link(1))))
```

2. (5 points) Tree Traversal

Make `BinTree`s iterable! such that if the tree were a binary *search* tree, we would iterate over the values in order of least to greatest. In other words, we want to perform an *inorder traversal*, in which we iterate over the labels on the `left`... followed by the current node's label... followed by the labels on the `right`.

What method(s) do we need to implement?

```
class BinTree:
    empty = ()
    def __init__(self, label, left=empty, right=empty):
        self.label = label
        self.left = left
        self.right = right

    def __iter__(self):
        yield from self.left
        yield self.label
        yield from self.right

    Or, equivalently:

    def __iter__(self):
        for l_label in self.left:
            yield l_label
        yield self.label
        for r_label in self.right:
            yield r_label
```