

CS 456/556: Advanced Declarative Programming

Flipped Classroom Exercise 1

1. Consider the following definition of a binary tree type:

```
data Btree a = Leaf a | Fork (Btree a) (Btree a)
```

- Make *Btree* an instance of type class *Functor*.
- Define a function *iota* which, given an integer n , returns a *Btree Int* with n leaves.
- Make *Btree* an instance of type class *Monad*.
- Verify that the *Btree* monad satisfies the monad laws.

2. Consider the following definition of a list of lists type:

```
newtype Lulz a = Lulz {runLulz :: [[a]]}
```

- Make *Lulz* an instance of type class *Functor*.
- Define a function *rho* which, given an integer n , returns a *Lulz Int* of size $n \times n$.
- Make *Lulz* an instance of type class *Monad*.
- Verify that the *Lulz* monad satisfies the monad laws.