Why teaching functional programming to undergraduates at CUNY is important

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Functor Law intuition

If functors mean that something can be mapped over...

- then calling 'fmap' on a functor should
  - map a function over the functor

Functor Law intuition

If functors mean that something can be mapped over...

- then calling 'fmap' on a functor should
  - map a function over the functor
- Nothng else

The First Functor Laws

Definition (The First Functor Law)

states that if we map the identity (id) function over a functor, we get the functor

- fmap id = id

Identity in the Repl

Identity functions in the repl

```
fmap id (Just 3)
id (Just 3)
fmap id [1..5]
id [1..5]
fmap id []
fmap id Nothing
1==1

Just 3
Just 3
[1,2,3,4,5]
[1,2,3,4,5]
[]
Nothing
```

The Second Functor Law

Definition (The Second Functor Law says)

The Second Functor Law says that composing two functions and then mapping the composed function over a functor is the same as first mapping one function over the functor and then mapping the other one.

- fmap (f.g) = fmap f . fmap g
- fmap (f.g) F = fmap f (fmap g F)

Composition in the Repl

Composition functions in the repl

```
fmap ((+1).(*2)) (Just 3)
fmap (+1) (fmap (*2) (Just 3))
fmap  ((+1).(*2)) [1..5]
fmap (+1) (fmap (*2) [1..5])
1==1

Just 7
Just 7
[3,5,7,9,11]
[3,5,7,9,11]
```