

Monoid (4A)

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Based on

<http://learnyouahaskell.com/making-our-own-types-and-typeclasses#the-functor-typeclass>

<http://learnyouahaskell.com/functors-applicative-functors-and-monoids>

Haskell in 5 steps

https://wiki.haskell.org/Haskell_in_5_steps

Binary Operation

associativity

```
GHCi> (5 + 6) + 10
```

```
21
```

```
GHCi> 5 + (6 + 10)
```

```
21
```

```
GHCi> (5 * 6) * 10
```

```
300
```

```
GHCi> 5 * (6 * 10)
```

```
300
```

```
GHCi> ([1,2,3] ++ [4,5,6]) ++ [7,8,9]
```

```
[1,2,3,4,5,6,7,8,9]
```

```
GHCi> [1,2,3] ++ ([4,5,6] ++ [7,8,9])
```

```
[1,2,3,4,5,6,7,8,9]
```

an identity element

```
GHCi> 255 + 0
```

```
255
```

```
GHCi> 0 + 255
```

```
255
```

```
GHCi> 255 * 1
```

```
255
```

```
GHCi> 1 * 255
```

```
255
```

```
GHCi> [1,2,3] ++ []
```

```
[1,2,3]
```

```
GHCi> [] ++ [1,2,3]
```

```
[1,2,3]
```

<https://en.wikibooks.org/wiki/Haskell/Monoids>

Monoid Type Definition

```
class Monoid m where
  mempty :: m
  mappend :: m -> m -> m
  mconcat :: [m] -> m
  mconcat = foldr mappend mempty
```

<https://wiki.haskell.org/Currying>

<http://learnyouahaskell.com/functors-applicative-functors-and-monoids>

Currying

`mempty `mappend` x = x`

`x `mappend` mempty = x`

`(x `mappend` y) `mappend` z = x `mappend` (y `mappend` z)`

<https://wiki.haskell.org/Currying>

<http://learnyouahaskell.com/functors-applicative-functors-and-monoids>

References

- [1] <ftp://ftp.geoinfo.tuwien.ac.at/navratil/HaskellTutorial.pdf>
- [2] <https://www.umiacs.umd.edu/~hal/docs/daume02yaht.pdf>