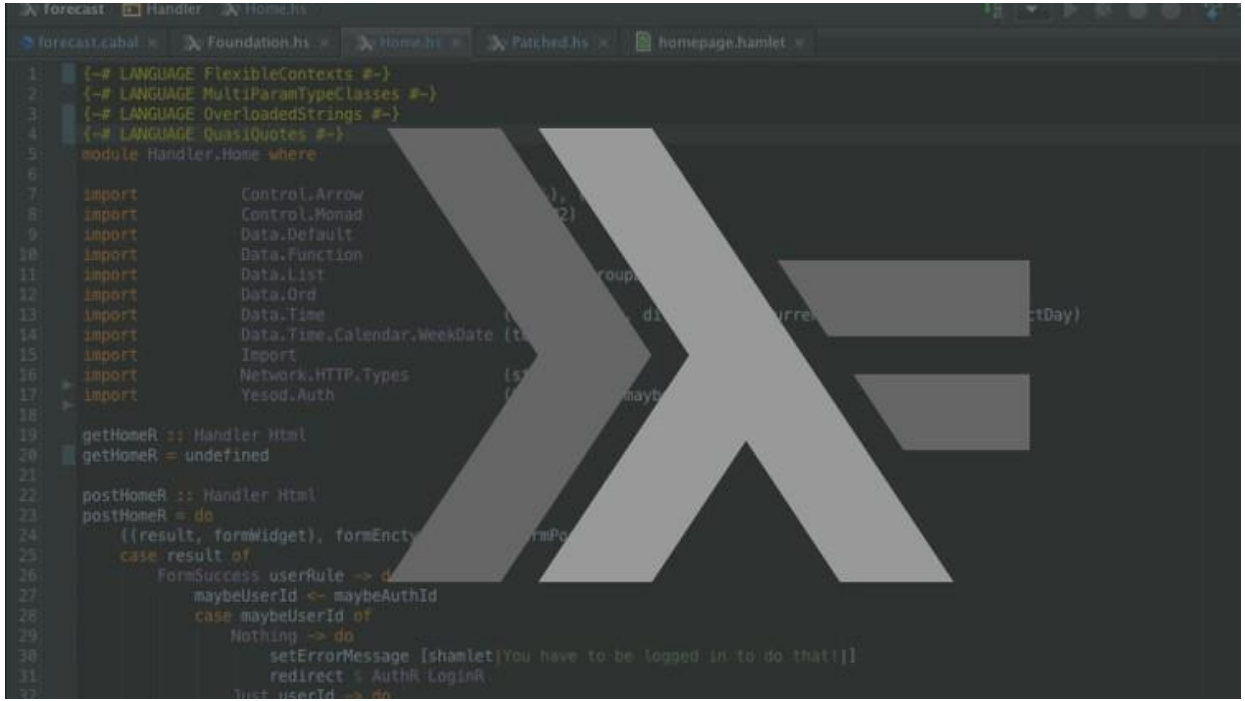
Common Functions



head, last

- Signature:

```
head :: [a] -> a
last :: [a] -> a
```

- Description:
  - `head xs` is the first element of the list `xs`.
  - `last xs` is the last element of the list `xs`.

  Error if `xs` is empty.

- Examples:

```
λ> head [1..6]
👉 1
λ> last [1..6]
👉 6
```

tail, init

- Signature:

```
tail :: [a] -> [a]
init :: [a] -> [a]
```

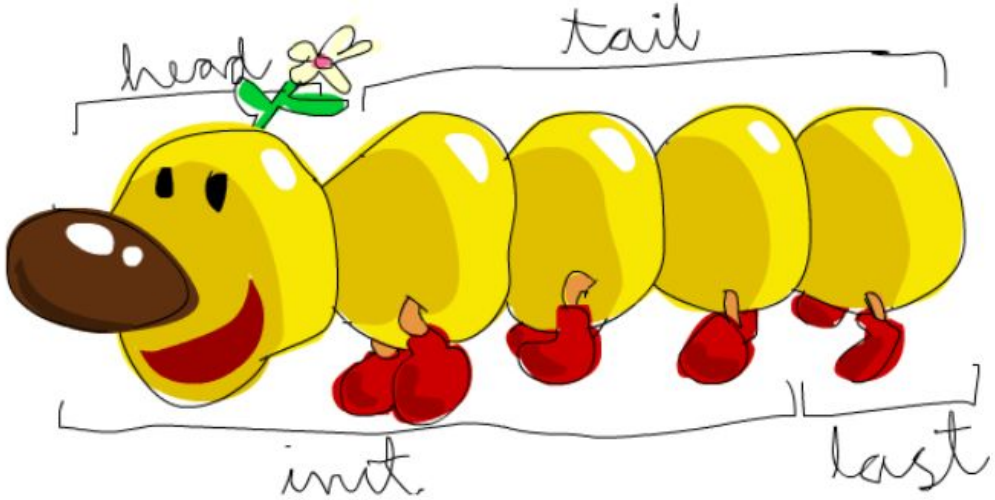
- Description
  - `tail xs` is the list `xs` without its first element.
  - `init xs` is the list `xs` without its last element.

  Error if `xs` is empty.

- Examples:

```
λ> tail [1..4]
👉 [2, 3, 4]
λ> init [1..4]
👉 [1, 2, 3]
```

head, last, init, tail



reverse

- Signature:

```
reverse :: [a] -> [a]
```

- Description:

`reverse xs` is the list `xs` backwards.

- Examples:

```
λ> reverse [1..4]
☞ [4, 3, 2, 1]
```

length

- Signature:

```
length :: [a] -> Int
```

- Description:

  `length xs` is the number of elements in the list `xs`.

- Examples:

```
λ> length []
👉 0
λ> length [1..5]
👉 5
λ> length "Angela"
👉 6
```

null

- Signature:

```
null :: [a] -> Bool
```

- Description:

`null xs` indicates if the list `xs` is empty.

- Examples:

```
λ> null []
☞ True
λ> null [1..8]
☞ False
```

elem

- Signature:

```
elem :: Eq a => a -> [a] -> Bool
```

- Description:

`elem x xs` indicates if `x` is in the list `xs`.

- Examples:

```
λ> elem 6 [1..10]
👉 True
λ> 6 `elem` [1..10]
👉 True
λ> 'k' `elem` "Ethan"
👉 False
```

Indexing (!!)

- Signature:

```
(!!) :: [a] -> Int -> a
```

- Description:

  `xs !! i` is the `i`th element of the list `xs` (starting from zero).

- Examples:

```
λ> [1..10] !! 3
👉 4
λ> [1..10] !! 11
❌ Exception: index too large
```

Concatenation of two lists

- Signature:

```
(++) :: [a] -> [a] -> [a]
```

- Description:

`xs ++ ys` is the resulting list of putting `ys` after `xs`.

- Examples:

```
λ> "JIM" ++ "MY"
👉 "JIMMY"
λ> [1..5] ++ [1..3]
👉 [1,2,3,4,5,1,2,3]
```

maximum, minimum

- Signature:

```
maximum :: Ord a => [a] -> a
minimum :: Ord a => [a] -> a
```

- Description:
  - `maximum xs` is the biggest element of the list (non empty!) `xs`.
  - `minimum xs` is the smallest element of the list (non empty!) `xs`.
- Examples:

```
λ> maximum [1..10]
👉 10
λ> minimum [1..10]
👉 1
λ> minimum []
❌ Exception: empty list
```

sum, product

- Signature:

```
sum     :: Num a => [a] -> a
product :: Num a => [a] -> a
```

- Description:
  - `sum xs` is the sum of the list `xs`.
  - `prod xs` is the product of the list `xs`.
- Examples:

```
λ> sum [1..5]
☞ 15

factorial n = product [1 .. n]

λ> factorial 5
☞ 120
```

take, drop

- Signature:

```
take :: Int -> [a] -> [a]
drop :: Int -> [a] -> [a]
```

- Description:
  - `take n xs` is the prefix of length `n` of the list `xs`.
  - `drop n xs` is the sufix of the list `xs` when the first `n` elements are removed.

- Exemples:

```
λ> take 3 [1 .. 7]
☞ [1, 2, 3]
λ> drop 3 [1 .. 7]
☞ [4, 5, 6, 7]
```

zip

- Signature:

```
zip :: [a] -> [b] -> [(a, b)]
```

- Description:

`zip xs ys` is the list that combines, in order, each pair of elements of `xs` and `ys`. If they are missing, they are lost.

- Examples:

```
λ> zip [1, 2, 3] ['a', 'b', 'c']
👉 [(1, 'a'), (2, 'b'), (3, 'c')]
λ> zip [1 .. 10] [1 .. 3]
👉 [(1, 1), (2, 2), (3, 3)]
```

repeat

- Signature:

```
repeat :: a -> [a]
```

- Description:

`repeat x` is the infinite list where all elements are `x`.

- Examples:

```
λ> repeat 3
☞ [3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, ...]
λ> take 4 (repeat 3)
☞ [3, 3, 3, 3]
```

concat

- Signature:

```
concat :: [[a]] -> [a]
```

- Description:

`concat xs` is the list that concatenates all the lists of `xs`.

- Examples:

```
λ> concat [[1, 2, 3], [], [3], [1, 2]]
☞ [1, 2, 3, 3, 1, 2]
```

Instructor Youtube Channel: Lucas Science