

How do function signatures associate with respect to partial application?

They associate to the right.

$a \rightarrow a \rightarrow a$

is just the same as

$a \rightarrow (a \rightarrow a)$

If a type parameter uses both arithmetic and ordering it must ...

... be a member of both `Num` and `Ord` since `Num` is not a type of `Ord`.

Partially apply an infix function.

Use sections:

Surround the infix function with parens and only supply an argument on one side but not the other.

What's the problem-case of sections?

How can you get around it?

– means negative before it means minus.

Use `subtract` instead of `-`.



What should you do if you're unsure of the type of a function you're writing?

See what Haskell infers using `:t`.

Create a new function that reverses the order of the input function's first to parameters.

```
ghci> :t flip
```

```
flip :: (a -> b -> c) -> b -> a -> c
```

What's annoying about `length`?

It returns an `Int` instead of a `Num a`.

What happens if you don't put parens around  
a lambda?

The function body will extend to the end of the line.



How is pattern matching params different in  
lambdas?

Only one pattern is allowed.

What are `scanl/scanr`?

They are like `foldl/foldr`, but they report all intermediate accumulator states as a list.

`scanl` places the final result last, `scanr` puts it first.

What are `foldl1`/`scanl1`/etc?

They do not require explicit starting values. They assume the first (or last, depending on direction) value as the starting value.

Define \$.

What's its point?

$(\$)\ ::\ (a \rightarrow b) \rightarrow a \rightarrow b$

$f \$ x = f x$

It's function application with the lowest (as opposed to the highest) precedence. It is typically used to introduce right association to minimize the number of needed parens.



Define ..

$(.) :: (b \rightarrow c) \rightarrow (a \rightarrow b) \rightarrow a \rightarrow c$

$f . g = \lambda x \rightarrow f (g x)$

In general, the direction of association ...

... cannot be determined from the name of a function alone.

How can composition be used with functions of several parameters?

The functions must be partially applied until each function just takes one function.g

What's a common use of composition?

Using partial application in a function whose result is the argument to another function.

```
fn x = ceiling (negate (tan (cos (max 50 x))))  
fn = ceiling . negate . tan . cos . max 50
```