



-- Why does this work:

```
g xs ys = map fst . filter (uncurry (==)) $ zip xs ys
```

-- But this does not:

```
g = map fst . filter (uncurry (==)) $ zip
```

-- i.e., why can't we just remove the arguments as we have done a lot of times earlier? The problem is that zip will not consume both arguments before being passed to the "filter" function. Thus, we do not pass a list ("filter" expects a list) but the function "zip xs". Why is this a function? Because it takes an argument (a list (here ys)) and returns a list of tuples.

-- Thus we need to find a way to "force" zip to consume both arguments first. This solves the problem:

```
g = (map (fst) . ) . (filter (uncurry (==)) . ) . zip
```

-- This is the best explanation I could come up with for this solution (and why it does what we want), I hope its somewhat understandable:

--Consider this fact:

```
(f . (g x)) = ((f . ) . g) x
```

-- What happens here on the right side and why is it equal to the left side? Not trivial to see but during the evaluation, haskell does this: The outermost function is the second (.). Thus, we could theoretically rewrite the entire thing like this:

```
((.) (f .)g) x
```

-- Note that all I have done is rewriting the RHS from infix to "normal" function notation. Now since we cannot evaluate further without consuming the argument x, we proceed by doing so: The function ((.) (f .) g) consumes an argument by passing it as an argument to its "second argument", thus g.

-- [If you are advanced: What actually happens is that a new function is created where first (.) consumes (f.) to create an "intermediate" function which then consumes the function g to create a function that consumes x. But this "final" function consumes x in such a way that first x is applied to g and then the result is passed to (f.)]

-- Hence, we get:

```
((.) (f .) g) x = (f .) (g x) = f . (g x)
```

-- Now, if we have two arguments, the following happens:

```
((f . ) . g) x y
= ((.) (f .) g) x y
= ((f .) (g x)) y
= (f . (g x)) y
```

-- Now, using the same logic (Def. of composition) as earlier, we see that the function (f . (g x)) consumes its argument (y) by applying it to the second argument of (.), thus (g x), i.e. (here the same note holds as earlier):

```
(f . (g x)) y = f ((g x) y) = f (g x y)
```

-- Thus if you have some function g that should consume two arguments before being passed as an argument to the "next" function f in a composition (in this exercise you'd use \$ but in this special case it is logically (not tech.!!) equivalent), you write the composition as

```
(f .) . g
```

-- instead of just

```
f . g
```

--to make g consume the two arguments first.