

Programming Paradigms 2025

Session 4 : Defining functions; List comprehension

Preparing for the session

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Where nothing else is mentioned, chapters and page numbers refer to *Programming in Haskell*.

The video podcast

You can watch the podcast on YouTube via the course page on Moodle.

Tuesday 30 September 2025 – Defining functions; List comprehension

The text is Chapters 4 and 5 of *Programming in Haskell*.

Learning goals for the session

- To understand the syntax and informal semantics of conditional expressions and guards and to be able to use these when programming in Haskell
- To understand and be able to use the different forms of patterns and pattern matching when programming in Haskell
- To understand anonymous functions (lambda expressions) in Haskell
- To understand the notion of list comprehension and how guards are used in comprehensions
- To be able to use list comprehension for defining functions in Haskell
- To understand how all these notions can be used in when building larger programs and to be able to apply this understanding when programming in Haskell

How you should prepare before we meet on Tuesday

Before we meet, watch the podcast and read the text. You can do this in any order you like.

Also see if you can solve the following two small preparation problems. We will talk about them in class.

1. Define, using pattern matching and *without using the length function*, a function `onlytwo` that tells us if a list has precisely two elements – in which case it must return True – or not, in which case it must return False. What is the type of `onlytwo`?
2. The dot product of two pairs of numbers (a, b) and (c, d) is the number $a \cdot c + b \cdot d$. Define, *using list comprehension*, a function `alldots` that takes two lists of pairs of numbers and returns all the possible dot products of every pair from the first list and every pair from the second list. Find two good test case for testing your function definition and use them to test your code. What is the type of `alldots`?