COMP105: Programming Paradigms
Week 6 Homework Sheet

This is the homework sheet for **Week 6**. Complete your answers in a file named `week6.hs` and submit them to the "Week 6" assessment in SAM here

`https://sam.csc.liv.ac.uk/COMP/Submissions.pl`

Submission of the weekly homework sheets contributes 10% of the overall module mark, and each homework sheet counts equally towards this. Each homework sheet will be marked on a pass/fail basis. You will receive full marks for submitting a *reasonable attempt* at the homework. If no submission is made, or if a non-reasonable attempt is submitted, then no marks will be awarded.

The deadline for submission is

Friday Week 6 (20/11/2020) at 16:00.

Late submission is **not** possible. Individual feedback will not be given, but full solutions will be posted promptly after the deadline has passed.

If you feel that you are struggling with the homework, or if you have any other questions, then you can contact the lecturer at any point during the week via email, or you can drop in to the weekly Q&A session on MS Teams on Friday between 1PM and 4PM.

Lecture 16 - Fold

1. Use `foldr` and the `*` operator to write a function `list_product` that multiplies all elements of a list together.

2. Use `foldr` and the `||` operator (or) to write a function `list_any` that takes a list of Bools, and returns True if any of the list elements are True.

3. Use `foldr` to write a function `product_of_evens` that takes a list of numbers, and multiplies all the even elements together.

4. Use `foldr` to write a function `lt10` that takes a list of numbers and returns the number of elements that are strictly less than 10.

Lecture 17 - Scan For each of the functions in "Lecture 16 - Fold", write a new version of the function that replaces `foldr` with `scanr`. Check that you understand the output of the new function.

Lecture 17 - takeWhile and dropWhile

1. Use `takeWhile` to write a function `leading_caps` that takes a string, and returns the elements before the first small letter of the string.

2. Use `dropWhile` to write a function `drop_caps` that takes a string, and returns all of the elements after (and including) the first small letter of the string.

3. (*) Use `takeWhile` and `dropWhile` to write a function `split_on c string` that takes a character `c` and a string, and returns a pair `(before, after)`, where `before` contains everything before the first instance of `c`, and `after` contains everything after the first instance of `c`. The first instance of `c` in the string should be dropped if it exists.

Lecture 17 - zipWith.

1. Use `zipWith` to write a function `mul_lists` that multiplies two lists together.

2. Use `zipWith` to write a function `and_lists` that takes two lists of Bools, and applies `&&` to each pair of boolean values.

3. (*) Use `reverse`, `zipWith`, and `and` (returns True if a list of Bools only contains True) to write a function `is_palindrome` that returns true if a string is a palindrome.