

For all questions using a variables, loop is forbidden
Answer questions, first using : match, case, ::, Nil
than using map, flatMap, filter, foldLeft

1) Find the penultimate (last but one) element of a list .

Example:

```
scala> penultimate(List(1, 1, 2, 3, 5, 8))  
res0: Option[Int] = Some(5)
```

2) Find the length/ number of elements of a list.

Example:

```
scala> length(List(1, 1, 2, 3, 5, 8))  
res0: Int = 6
```

3) Flatten a nested list structure using the flatMap method.

Example:

```
scala> flatten(List(List(1, 1), List(2), List(3), List(5, 8)))  
res0: List[Any] = List(1, 1, 2, 3, 5, 8)
```

4) Duplicate the elements of a list using flatMap

Example:

```
scala> duplicate(List(1, 2, 3, 4, 5))  
res0: List[Int] = List(1, 1, 2, 2, 3, 3, 4, 4, 5, 5)
```

5) Drop every element which index is a multiple of n from a list, using flatMap/collect/map/foldLeft/zipWithIndex/filter

Example:

```
scala> drop(3, List(1, 2, 3, 4, 5, 6))  
res0: List[Symbol] = List(1, 2, 4, 5)
```

6) Read lines from a given file with detail errors using match/case.

Left may contains string such as : "empty string is not a valid path", "given path point to a directory instead of a file is required".

Example:

```
scala> readLines4("titi.txt")  
res0: Right[List[String]] = Right(List("foo", "bar"))
```

7) Rewrite question 6 using subfunction and flatMap.

If a list contains repeated elements they should be placed in separate sublists.

8) Rewrite question 7 using for comprehension.

9) Given a user id list the name and birthdays of its relatives.

- case class User(id : Long, name : String, birthdate : Option[Date], companionId : Option[long], childrenId : List[Long])
- userById : Future[Option[User]]

Given

10) Write a higher order function that read lines from a given file. And process each lines with a function given in parameter. Take the time to think about the prototype.

a) Write a version with clearest and simplest code possible.

b) write a memory optimised version

c) write a performance optimised version (consider it may be used in a multi-threaded app).

10) Write the compute function that take a list of number or operation in reverse polish notation. A number can be either a complex or a real. An operation can be either an addition, a multiplication or a substraction.