Run-Length Encoding

Compression

1. Exercise: Define a function

*chomp* :: *String ! String*

that selects a run of repeated characters from the start of a string, with the

run being as long as possible.

For example:

*> chomp* "aaaaabbbbcc"

"aaaaa"

*> chomp* "dddddddddddd"

"dddddddddddd"

*2.* Exercise: Using *chomp*, define a function

*runs* :: *String !* [*String*]

that splits a string into a list of runs of repeated characters, with each run

comprising at most nine characters.

For example:

*> runs* "aaaaabbbbcc"

["aaaaa","bbbb","cc"]

*> runs* "dddddddddddd"

["ddddddddd","ddd"]

*3.* Exercise: Using *runs*, define a function

*encode* :: *String !* [(*Char; Int*)]

that transforms a string into a list of pairs comprising the character from each

run together with its number of repetitions.

For example:

*> encode* "aaaaabbbbcc"

[('a',5),('b',4),('c',2)]

*> encode* "dddddddddddd"

[('d',9),('d',3)]

*4.* Exercise: Define a function

*flatten* :: [(*Char; Int*)] *! String*

That flattens a list of pairs of characters and digits to a string. For example:

*> flatten* [('a',5),('b',4),('c',2)]

"a5b4c2"

*> flatten* [('d',9),('d',3)]

"d9d3"

*5.* Exercise: Using *encode* and *flatten*, define a function

*compress* :: *String ! String*

that compresses a string using run-length encoding.

 For example:

*> compress* "aaaaabbbbcc"

"a5b4c2"

*> compress* "dddddddddddd"

"d9d3"

Decompression

*6.* Exercise: Define a function

*decode* :: [(*Char; Int*)] *! String*

that performs the inverse function to *encode*.

For example:

*> decode* [('a',5),('b',4),('c',2)]

"aaaaabbbbcc"

*> decode* [('d',9),('d',3)]

"dddddddddddd"

*7.* Exercise: Define a function

*expand* :: *String !* [(*Char; Int*)]

that performs the inverse function to *flatten*.

 For example:

*> expand* "a5b4c2"

[('a',5),('b',4),('c',2)]

*> expand* "d9d3"

[('d',9),('d',3)]

*8.* Exercise: Using *decode* and *expand*, define a function

*decompress* :: *String ! String*

that performs the inverse function to *compress*.

 For example:

*> decompress* "a5b4c2"

"aaaaabbbbcc"

*> decompress* "d9d3"

"dddddddddddd"