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Assignment 3
CSI2120 Programming Paradigms
Winter 2015
Due on March 16th, 2015 before 11:00 pm in Virtual Campus
[5 marks in total]

Question 1. **[2 points]**

Run-length encoding is used to represent a list containing repeated entries. The encoding specifies a symbol and the number of its repetitions. For example:

(a a a a b c c a a d e e e e)

is encoded as

((4 a) (1 b) (2 c) (2 a) (1 d) (4 e))

Design the function `decode-rl` to return the list decoded. For example:

(decode-rl '((4 a) (1 b) (2 c) (2 a) (1 d) (4 e)))

⇨ (a a a a b c c a a d e e e e)

Question 2. **[1.5 points]**

1. [1 point] Design a function that takes a number and puts the individual digits of the number in a list.

   (num2Digit 2536)
   ⇨ (2 5 3 6)

2. [0.5 point] Design a function that returns the number of digits of a number.

   (nDigit 2536)
   ⇨ 4

   Hint: The modulo function may be useful.

Question 3. **[1.5 points]**

The theosophique reduction adds up all the digits of a number, e.g., 215 works out to 2+1+5=8.

1. [0.5 point] Design a function that calculates the reduction of X.

   (reduction 215)
   ⇨ 8

2. [1.0 point] When the reduction of X results in a number greater than 10, the reduction needs to be recursively applied again until a single digit number is obtained. For example:

   (reductionTheosophique 754)
   ⇨ 7

   This is the correct result because 7+5+4=16 which is 1+6=7.