CSC 735 – HW 1  
Due Date: Tuesday, September 25, 2018 at 9:30 am

Credit card numbers follow certain patterns. The number must have between 13 and 16 digits, and it must start with:

* 4 for Visa cards
* 5 for MasterCard credit cards
* 37 for American Express cards
* 6 for Discover cards

In 1954, Hans Luhn of IBM proposed an algorithm for validating credit card numbers. The algorithm is useful to determine whether a card number is entered correctly by a user or scanned correctly by a scanner. Credit card numbers are generated following this validity check, commonly known as the Luhn check or the Mod 10 check, which can be described as follows (for illustration, consider the credit card number 4388576018402626):

1. Double every second digit from right to left. If doubling of a digit results in a two-digit number, add up the two digits to get a single-digit number.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4 | 3 | 8 | 8 | 5 | 7 | 6 | 0 | 1 | 8 | 4 | 0 | 2 | 6 | 2 | 6 |
| 4\*2=8 |  | 8\*2=16 (1+6=7) |  | 5\*2=10 (1+0=1) |  | 6\*2=12 (1+2=3) |  | 1\*2=2 |  | 4\*2=8 |  | 2\*2=4 |  | 2\*2=4 |  |

1. Now add all single-digit numbers from step 1:  
     
   4 + 4 + 8 + 2 + 3 + 1 + 7 + 8 = 37
2. Add all the digits in the odd places from right to left in the card number:

6 + 6 + 0 + 8 + 0 + 7 + 8 + 3 = 38

1. Sum the results from Steps 2 and 3:  
     
   37 + 38 = 75
2. If the result from Step 4 is divisible by 10, the card number is valid; otherwise, it is invalid. For example, the number 4388576018402626 is invalid, but the number 4388576018410707 is valid.

Write a Scala program that checks whether or not a number is a valid credit card number. The program reads input from an input file named **numbers.txt** and displays the output to standard output (the computer's screen). Each line in the file contains a single number. The output must be either the string valid or the string invalid with no extra leading or trailing spaces (this is important in case a script is used to check your output). Sample input and the corresponding output are as follows:

|  |  |
| --- | --- |
| 4388576018402626  4388576018410707  4012888888881881  4552720412345677  4539992043491562  4992739871600  4992739870017  80840123456789  5588320123456789  5491946915444923  5490123456789128  378282246310005  371449635398431  371449635398431  378734493671000  378734493671001  6041273990139424  6011111111111117  6011000990139424 | invalid  valid  valid  valid  valid  valid  invalid  invalid  invalid  invalid  valid  valid  valid  valid  valid  invalid  invalid  valid  valid |

Please give your program the name **hw1.scala**. Use comments to document and explain your code where needed. Make sure to use functions to break the code into segments. Make sure to **upload an electronic copy of your source code to blackboard**. Make sure to **also turn in a stapled hard copy of the source code in class on the due date**. Write your name at the top of your file.

Your code will be run using the command **scala hw1.scala**. Assume that the input file is in the same folder as the program. You can write your program as a Scala application or organize it into different functions similar to a Python program.