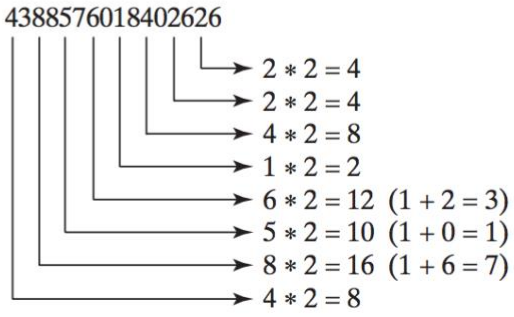
(*Financial: credit card number validation*) Credit card numbers follow certain patterns: It must have between 13 and 16 digits, and the number must start with:

- 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 or whether a credit card is 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 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.



2. Now add all single-digit numbers from Step 1.

$$4 + 4 + 8 + 2 + 3 + 1 + 7 + 8 = 37$$

3. Add all digits in the odd places from right to left in the card number.

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

4. Sum the results from Steps 2 and 3.

$$37 + 38 = 75$$

5. 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.

```
# Return true if the card number is valid
def isValid(number):

# Get the result from Step 2
def sumOfDoubleEvenPlace(number):

# Return this number if it is a single digit, otherwise, return
# the sum of the two digits
def getDigit(number):

# Return sum of odd place digits in number
def sumOfOddPlace(number):

# Return true if the digit d is a prefix for number
def prefixMatched(number, d):

# Return the number of digits in d
def getSize(d):

# Return the first k number of digits from number. If the
# number of digits in number is less than k, return number.
def getPrefix(number, k):
```

What to submit on blackboard?

1. Submit your program source code listing.
2. Submit your program output. Please provide several test results, not just one output test. result. Failure to submit your program output will lose 1/3 of your overall assignment points.