Algorithm Practice

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- ATM Algorithm - Bank machine (UK, ATM')

- Goal - ATM, a.k.a. Cash Withdrawal Machine, uses a computer program to interact with the customer and count the number of banknotes to dispense based on the customer's requested amount.

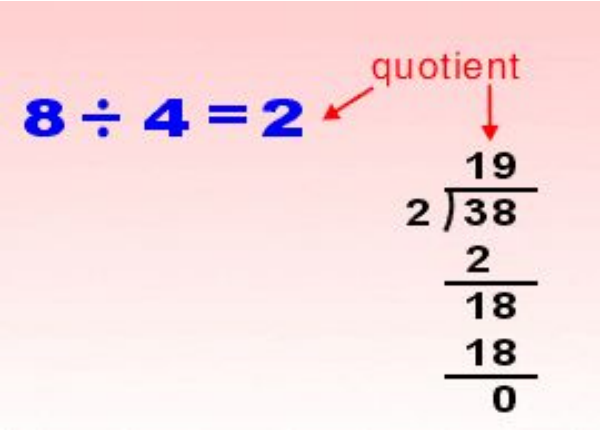
- In the UK, ATM's tend to only stock £20 banknotes and £10 banknotes and apply the following rules:
- The minimal amount that can be withdrawn is £10,
- The maximal amount that can be withdrawn is £200,
- The amount to be withdrawn must be a multiple of 10 e.g. £10, £20, £30, £40, ... £180, £190, £200.

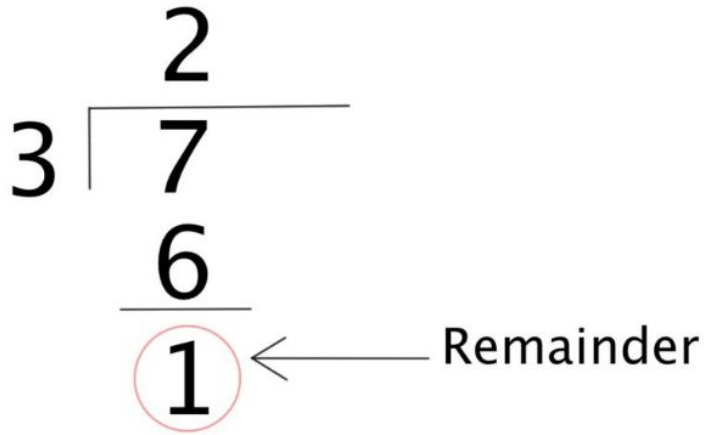
VISA
Visa Debit
4000 1234 5678 9010
DEBIT
VISA
12/20
A. MILLER

Maths before the Algorithm

Guess?

Use - Quotient (DIV) and Remainder (MOD)





To calculate how many **£20** banknotes and how many **£10** banknotes correspond to the requested amount, the ATM program uses two arithmetic operators called **DIV and MOD**.

The quotient (DIV) returns the result of the whole division. For instance:

70 DIV 20 = 3
The remainder (MOD) returns the remainder of the whole division. For instance:

70 MOD 20 = 10
By using these operators we can deduct that £70 pounds will result in:

70 DIV 20 = 3 banknotes of £20
70 MOD 20 = 10 (= 1 banknote of £10)
Note that in Python the DIV operator is // whereas the MOD operator is %.
For instance:

quotient = 70 // 20
remainder = 70 % 20
Also to find out if a number is a multiple of 10, we can check if number MOD 10 == 0. Effectively, if the remainder of dividing this number by 10 is null, we can conclude that this number is a multiple of 10.

ATM Algorithm: Pseudocode

Pseudocode *“a notation resembling a simplified programming language, used in program design.”*

```
WHILE TRUE
   DISPLAY "Welcome to Python Bank ATM - Cash Withdrawal"
   amount = INPUT "How much would you like to withdraw today?"
   IF (amount MOD 10) != 0 THEN
      DISPLAY "You can only withdraw a multiple of ten!"
   ELSE
      IF amount<10 OR amount>200 THEN
         DISPLAY "You can only withdraw between £10 and £200"
      ELSE
         notes20 = amount DIV 20
         notes10 = (amount MOD 20) / 10
         DISPLAY "Collect your money: "
         DISPLAY "    >> £20 Banknotes: " + notes20
         DISPLAY "    >> £10 Banknotes: " + notes10
         DISPLAY "Thank you for using this Python Bank ATM."
         DISPLAY "Good Bye."
      END IF
   END IF
END WHILE
```

Home task write a program for it