Machine Learning Coding Test

Instructions:

* You may use any programming language for the test below
* You are required to write test cases for your answers
* Submit the source code by either uploading a zip file to google drive or provide a **private** git repository link to [alvin.yeung@alvanon.com](mailto:alvin.yeung@alvanon.com) and [stephen.sze@alvanon.com](mailto:stephen.sze@alvanon.com)
* If you have any questions, please send to [alvin.yeung@alvanon.com](mailto:alvin.yeung@alvanon.com)

Question 1:

We define super digit of an integer using the following rules:

* If x has only 1 digit, then its super digit is x.
* Otherwise, the super digit of x is equal to the super digit of the digit-sum of x. Here, the digit-sum of a number is defined as the sum of its digits.

For example, super digit of 9875 will be calculated as:

super\_digit(9875) = super\_digit(9+8+7+5)

= super\_digit(29)

= super\_digit(2+9)

= super\_digit(11)

= super\_digit(1+1)

= super\_digit(2)

= 2.

You are given two numbers n and k. You have to calculate the super digit of P.

P is created when number n is concatenated k times. That is, if n = 123 and k = 3, then P = 123123123.

Constraints

* 1 <= n < 10^100000
* 1 <= k <= 10^5

Output the super digit of P, where P is created as described above.

Sample Input: 148 3

Sample Output: 3

Explanation:

Here n = 148 and k = 3, so P = 148148148.

super\_digit(P) = super\_digit(148148148)

= super\_digit(1+4+8+1+4+8+1+4+8)

= super\_digit(39)

= super\_digit(3+9)

= super\_digit(12)

= super\_digit(1+2)

= super\_digit(3)

= 3.

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Question 2:

A valid credit card from ABCD Bank has the following characteristics:  
► It must start with a 4, 5 or 6.  
► It must contain exactly 16 digits.  
► It must only consist of digits (0-9).  
► It may have digits in groups of 4, separated by one hyphen "-".  
► It must NOT use any other separator like ' ' , '\_', etc.  
► It must NOT have 4 or more consecutive repeated digits.

Please write a function to validate if a given string is a valid credit card number.

Question 3:

Here are the test scores of 10 students in physics and history:

Physics Scores 15 12 8 8 7 7 7 6 5 3

History Scores 10 25 17 11 13 17 20 13 9 15

Compute Karl Pearson’s coefficient of correlation between these scores.  
Compute the answer correct to three decimal places.

Output Format

In the text box, print the floating point/decimal value required. Do not leave any leading or trailing spaces.

For example, if your answer is 0.255. In python you can print using

print("0.255")

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Question 4:

I lost the model training codes for my model, luckily I could still recover my model architecture and a saved .pt file. Could you help to recover the text? I believe the text starts with “a”.

(Please find the necessary files in the attached files)