PROBLEM NINE: SECURITY AND PREVENTING SOCIAL ENGINEERING

Traditional password entry schemes are susceptible to “shoulder surfing” in which an attack watches an unsuspecting user enter their PIN number and uses it later to gain access to the account. One way to combat this problem is with a randomized challenge-response system. In these systems, the user enters different information every time based on a secret in response to a randomly generated challenge.

We will consider the following scheme in which the password consists of a five-digit PIN number (00000 to 99999). Each digit is assigned a random number that is 1, 2, or 3. The user enters the random number that correspond to their PIN instead of their actual PIN numbers.

For example, consider an actual PIN number 12345, To authenticate, the user would be presented with a screen such as:

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PIN: 0   1   2   3   4   5   6   7   8   9
NUM: 3   2   3   1   1   3   2   2   1   3
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The user would enter 23113 instead of 12345. This does not divulge the password even if an attack intercepts the entry because 23113 could correspond to other PIN numbers, such as 69440 or 70439. The next time a user logs in, a different sequence of random number would be generated.

Write a program to simulate the authentication process. The random numbers 1, 2 and 3 must be assigned by a randomly generated process in your program, not hard-coded. Output the random digits to the screen, input the response from the user, and output whether or not the user’s response correctly matches the PIN number. The program must accept the user’s actual PIN as a command line argument. The PIN must be five digits, and every digit must be unique, otherwise, your program should indicated a invalid PIN number was passed.

REQUIRED INPUT: A 5-digit PIN number as a command line argument, where every number is unique, including number 0-9. Then output the authentication screen and prompt the user to enter the coded PIN.
REQUIRED OUTPUT: A message indicating if the coded PIN was authenticated or not. If an invalid PIN number was passed via the command line argument, then output an invalid PIN message.