Problem 1. What is the relationship of ROT13 with Caesar’s cipher?

Problem 2. The algorithm for encrypting data we studied today uses a secret keyword where we used each letter of the word to come up with a shift after repeating the secret keyword many times. Encode the following word using the secret keyword “AIM”.

String to be encoded: I AM ENJOYING THIS COURSE!

Problem 3. I used Caesar’s cipher to encrypt the following message. Can you decode it?
I used a shift that is < 5.

String: PGZVSWKBKUQPYGFOCTHQWTVGGP.

Problem 4. We had discussed Mickey’s Algorithm for verifying credit card numbers in the exam. Suppose credit card numbers are made up using 8 digits. Example: 8342 1219. To this we would like to add a 9th digit which will be our checksum digit X. The checksum in Mickey’s algorithm is chosen as follows. We take all the digits and add them doubling the alternate ones. Finally we choose X so that the entire number is 0 mod 10. An example is worked out in detail to make this process clear. Computing checksum for 8342 1219 (right to left): $9 \times 2 + 1 + 2 \times 2 + 1 + 2 \times 2 + 4 + 3 \times 2 + 8 = 18 + 1 + 4 + 1 + 4 + 4 + 6 + 8 = 46$. The checksum digit must be 4, so that the total is 50, which is 0 mod 10. So the card number would be issued as 8342 12194.

1. Suppose Goofey uses a different algorithm for computing checksum. He chooses the checksum such that the sum of all the digits plus the checksum digit is 0 mod 10. Which is a stronger scheme in terms of error detection? Why? Give an example where the stronger scheme catches an error in the number while the weaker one fails.

2. Give an example where the stronger scheme fails to detect an erroneous credit number.

Problem 5. Write a short description about the enigma machine.