Problem A: Score: 25

<u>SEND MORE MONEY</u>

One time in college I emailed my dad asking for money and he said I could have some if I solved the following equation:

```
  SEND
+MORE
───────
MONEY
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Each letter represents its own digit (0-9) and multiple occurrences of the same letter represent the same digit (eg if one of the E's represents a 3, they all do).

Hint N = 6

Problem B   Score: 25

WEIGHING IN A HARDER WAY

You've got 27 coins, each of them is 10g, except for 1. The 1 different coin is 9g or 11g (heavier, or lighter by 1g). You should use balance scale that compares what's in the two pans. You can get the answer by just comparing groups of coins.
What is the minimum number weighings that can always guarantee to determine the different coin.

Problem C: Score 50

1000 Wine Problem

The King of a small country invites 1000 senators to his annual party. As a
tradition, each senator brings the King a bottle of wine. Soon after, the Queen
discovers that one of the senators is trying to assassinate the King by giving
him a bottle of poisoned wine. Unfortunately, they do not know which senator,
nor which bottle of wine is poisoned, and the poison is completely
indiscernible. However, the King has 10 prisoners he plans to execute. He
decides to use them as taste testers to determine which bottle of wine
contains the poison. The poison when taken has no effect on the prisoner
until exactly 24 hours later when the infected prisoner suddenly dies. The
King needs to determine which bottle of wine is poisoned by tomorrow so that
the festivities can continue as planned. Hence he only has time for one round
of testing. How can the King administer the wine to the prisoners to ensure
that 24 hours from now he is guaranteed to have found the poisoned wine
bottle?