FOURTH PODCAST - BANK ACCOUNT NUMBERS AND MODULAR ARITHMETIC

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Hi this is Mike Zabrocki here with my fourth podcast for Math 2590.

Today I am going to tell you about one more application of modular arithmetic and how it was used to solve a problem of international banking.

An account number at my bank here in Canada has 11 digits, but say in Albania an account number has 16 digits. In the Czech Republic there are 10, and in Finland there are 7.

Every European country has a different system and, for Europe in particular, international banking faces a real problem.

Different national standards leads to money not being transferred to the correct account.

Sometimes routing information was missing from payments causing errors and other times typing errors were causing other difficulties.

The European committee for banking standards decided to try to solve this problem and developed an international banking account number (which is abbreviated IBAN).

This code includes different information for each country: a two letter country code, a bank code, a branch code, an account number; but some countries include just pieces of this information.

The IBAN also includes a two digit 'validation' code which is calculated from the rest of the information that is in the IBAN.

This is the important part of the code to make sure that no mistakes are made and it uses modular arithmetic.

There are obvious checks on the IBAN to make sure that it has the right number of digits for the country it is for and to make sure that certain digits are in the right range.

This does not solve the problem of the possibility that a digit or two are mistakenly out of order or just typed wrong.

This is where the validation digits come in.

These digits are calculated from the rest of the code (mod 97) and are placed there so that (mod 97) the code is equivalent to 1.

If a bank receives an IBAN number and calculates that (mod 97) that it is not equivalent to 1, then they know that the code is invalid and they ask that it be resent.

If a couple digits are interchanged or mistakenly transcribed then there is roughly a 1 in 97 chance that they will have the same value (mod 97).

This simple trick allowed banks to reduce their error rates to less than .1

One question I was asking myself while looking at this standard is 'what is so special about the number 97?'

I suspect that it is because it is the largest two digit prime number.

I would be willing to bet that they could have increased their accuracy by working mod 997 and having 3 validation digits, but the tradoff is an extra digit for potentially marginal improvements in the accuracy.

Reference: Wikipedia - International Bank Account Number (IBAN) http://en.wikipedia.org/wiki/International_Bank_Account_Number