ORMC Advanced 1: Linguistics (Notes and Solutions)

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These two links contain the original problems and solutions for problems 1, 2, and 4. Note that I've made minor changes to some of them and I'll still include some of my own notes and explanations for these problems below.

Problems: `https://ioling.org/booklets/samples.en.pdf`

Solutions: `https://ioling.org/booklets/samples.solution.en.pdf`

1 Georgian Countries

You can easily make one-to-one correspondences for Uruguay and Peru to obtain the symbols for p, e, r, u, g, a, y. The Georgian word for Brazil seems to have more letters but using the letters you already know, you might surmise that it's some analogue of the capital city 'Brasilia' (which is sort of true). This gives you the letters b, l, i.

The two remaining nations are:

- A R G E _ _ _ I _ A
- _ _ L U _ B I A

corresponding to Argentina and Columbia.

2 Kaktovik numerals

`https://en.wikipedia.org/wiki/Kaktovik_numerals`

When you see them all written out, you'll realize that Kaktovik numerals are ingeniously simple. Vertical lines are ones, horizontal lines are fives, and zero gets it's own symbol. Wikipedia actually describes it as base-20 with a 'sub-base' of 5.

Once you have the 20 basic symbols, representing any number from Arabic base-10 is just a matter converting to base-20, then replacing each symbol with the Kaktovik analogue.

3 Soundex

`https://en.wikipedia.org/wiki/Soundex`.

Also, see problem 3 here: `https://ioling.org/booklets/iol-2015-indiv-sol.en-us.pdf`.

There are also various websites that will convert strings to Soundex for you. For example:
`https://sites.rootsweb.com/~nedodge/transfer/soundexlist.htm`

Noether = N360, Hypatia = H130, Ramanujan = R552, Bernoulli = B654, Schrodinger = S635

Keep in mind that there are some complications regarding letters with the same digit separated by w, y, or h that some algorithms may treat differently.

4 Toki Pona

The solution in the link doesn't quite seem to match up with the problem for some reason, in addition to the modifications I made. Here are my solutions:

kiwen sulo jelo (gold), tomo tawa telo (boat), jan poka (friend), ilo suno (lantern), telo jelo (pee), jan ilo (robot), jan toki (prophet), supa lap (bed), supa moku (dinner table), ma tomo (city), wile moku (hungry), tawa (movement), nasin linja (orthodoxy), wile pona (well-intentioned), telo kiwen (ice), lipu toku (book), wile lawa (dominant), linja lawa (hair), tomo moku (restaurant), linja kiwen (thorn)

The diagram drawn in that solution is a nice way of tackling this problem. You may come up with any number of different ways of organizing the words. One intuitive approach is to group together related English words and try to match them with groups of Toki Pona words.

It also helps to be familiar with words and phonemes from existing languages. Here are some examples:

- supa/horizontal surface - supine (English), supinus (Latin)
- jelo/yellow - this one's pretty obvious
- jan/person - jan (Cantonese, pronounced like 'yun'), ren (Mandarin)
- ma/earth - maa (Finnish), it also feels natural to associate Earth with maternity

You can see a fairly comprehensive list of Toki Pona words and etymologies here: `https://en.wiktionary.org/wiki/Appendix:Toki_Pona`.

If you like this problem, you might enjoy diving into the philosophical motivations behind Toki Pona. The point is not to replace mainstream language, but merely to get you to think about how language affects your idea of reality.

See:

- `https://tokipona.org`
- `https://en.wikipedia.org/wiki/Linguistic_relativity`
- `https://en.wikipedia.org/wiki/Newspeak`
- `https://en.wikipedia.org/wiki/Taoism#Ziran`
- `https://en.wikipedia.org/wiki/Koan`

5 Homophonic Group

Ch. 2, Exercise M.16, p. 77 from *Algebra, 2nd edition* by Michael Artin.

This is kind of a silly problem but quite fun to think about. There are so many homophones in English that you can eventually show that $\mathcal{H}$ is just the trivial group, that is, every letter of the alphabet is the identity.

Here's an example of how you might do that:
`https://math.stackexchange.com/questions/843966/the-homophonic-group-a-mathematical-diversion`

6 Syllables and Factors

7 Deciphering Japanese

8 Recurrence Language

9 Microbablia