IOL Sample Solutions

Georgian Countries

In this question, one has only to decipher a different alphabet. For that, one can note that "Peru" and "Uruguay", in Georgian, have the same amount of characters as their translations; furthermore, the repetition of U in Uruguay assures us that Georgian is written left-to-right. So we can do the relation one-to-one. "Brazil", nevertheless, has more letters than the version in English, but thanks to the two other names, we already know some letters:

_ R A _ I _ I A

This should probably be "Brasilia" or "Brazilia". With those letters, we can guess the names of the other two countries:

A R G E _ _ I _ A

_ _ L U _ B I A

which can only be **Argentina** and **Colombia** (Columbia).

Ancient Greek

1.

E	1
C	2
D	3
H	4
A	5
B	6
G	7
F	8

This is a typical problem of syntax. In order to align the Ancient Greek sentences with the English sentences, you have figure out the content words (master, son, donkey, house, and slave) and the singulars and plurals. In order to get started, you need an anchor. Once you have an anchor, you can figure out the rest by logic and process of elimination.

Various anchors are possible. Three are described here.

i. Notice that four English sentences contain the word "master" or "masters" and that four Greek sentences contain words that start with **cyr**. No other word occurs four times. Therefore, "master" would be **cyr**.

ii. Count singulars and plurals. For example, in five English sentences, the second noun is plural and five Greek sentences have the word **ton**.

iii. Although you can do this problem without recognizing any words, you might have recognized a few. For example "adelphoi" looks like "Philadelphia", the city of brotherly love. If you know that "phil" means "love" as in "bibliophile" (book lover), then you would know that "adelphoi" means brother. You might also notice that "emporoi" reminds you of the word "emporium", which is a market place.

Japanese Braille

This is another writing system problem, but in this case it is not an alphabet. The word karaoke, in tenji, it has four characters, which may lead us to think that each character represents a syllable (ka-ra-o-ke). Counting syllables of the other words can confirm that tenji is a *syllabary*.

Inside the syllable structure, however, we must understand how consonants and vowels are represented. From "karaoke" can see that **ka** and **ra** have the same upper-left dot (⠡), differing only on the second dot position; furthermore, **ka** and **ke** have the same second dot position (down-right – ⠩). This is confirmed for there is a word starting with **a** (atari) and word f indeed starts with ⠡. So the vowels are represented in the three dots at the upper-left part of the diagram:

a	i	u	e	o
⠁	⠃	⠉	⠑	⠊

The other three dots represents the variety of consonants. So the answers are:

1.

a. haiku

b. sake

c. katana

d. kimono

e. koi

f. atari

2.

g. karate

h. anime

3.

i. ⠓⠁⠊⠅⠥

j. ⠚⠁

Lalana Chinantec

This is another syntax problem, in a model we call *Rosetta Stone*: some sentences are presented with translations and, with that, we can understand part of the grammar of the language.

In this case, the word order is not so obvious. We can start by marking the substantives: corn (x4) and pineapples (x2). After this, we can easily identify the pronoun "my" (x3). We can even paint the words, like this:

kalakwa: kwɨ: li:ʔ	The beautiful corn grew.
mɨladʒö mo:h kya	My pineapples have turned out well.
li:ʔ kalane kwɨ: kwa: kya	My tall corn yellowed beautifully.
dʒö kalaro:h mo:h ne kya	My yellow pineapples ripened well.
kaladʒö kwɨ:	The corn turned out well.
mɨlakwa: kwɨ:	The corn has grown

"yacare" leaves no doubt that *coara/ quara* is burrow, and *jericoa* as turtle. The river should appear once more, in *pirajuí* – the river (í) of the yellow (ju) fish (pira). The last one is *pindamonhangaba.*

So we have:

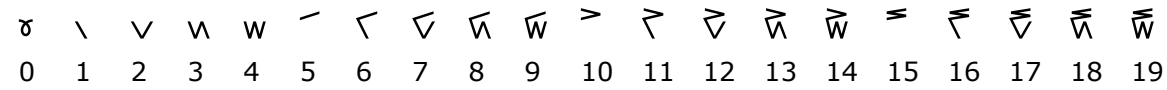
1. Ibiúna (SP)	**_7_** (a) white soil
2. Ibiporanga (SP)	**_15_** (b) great river
3. Iúna (ES)	**_5_** (c) place for producing fishing hooks
4. Tijuípe (BA)	**_4_** (d) lizard river
5. Pindamonhangaba (SP)	**_9_** (e) red river
6. Jacarecoara (MA)	**_8_** (f) turtle's burrow
7. Ibitinga (SP)	**_11_** (g) sound the water does in the rock
8. Jericoaquara (CE)	**_13_** (h) great rock
9. Ipiranga (PR)	**_6_** (i) alligator's/yacare's burrow
10. Tijuaçu (BA)	**_1_** (j) black soil
11. (Usina de) Itaipú (PR)	**_3_** (k) black river
12. Itatinga (SP)	**_14_** (l) fish of the yellow river
13. Itauçu (GO)	**_2_** (m) beautiful land
14. Pirajuí (SP)	**_10_** (n) big lizard
15. (Foz do) Iguaçu (PR)	**_12_** (o) white rock

Inuktitut Numbers

The problem presents a different number system. We can go in the order of operations presented:

1. In the first operation, we see that two bars are equal the sum of one bar with another. In the lack of further divisions of the bar, we can assume the bar is 1.
2. In the second operation, a new element appears: the dash (horizontal stroke). It is evident that one dash = 5 bars.
3. Operations 3, 4 and 5 confirm that, saying that we can also add dashes, and multiply the numbers.
4. Operation 6 says that (5+4) • (5+2) = 9 • 7 = 63 is represented as 3 3 (the repetition of the numeral with a space between them strongly suggests that this is a positional number system). So we discover that the numbers of the second position are counted from 20 to 20.
5. Operation 7 introduces the zero (the neutral element of sums).

Formally, we say that the system of positional notation has base 20 and a sub-base 5. In other words, the numbers from 0 to 19 are:



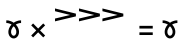
After that, we start to count using a second house:

etc.

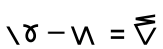
So the first number, right to left, count as the unities; the second position is multiplied by 20, as the third position is multiplied by $20^2 = 400$ and so on. So, in the same way that, in the indo-arabic system, $123 = 1 \bullet 100 + 2 \bullet 10 + 3$, in the Inuktitut system, \VA = \• 400 + V•20 + A = 443.

So the results of the operations of the second column are:

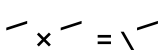
summing the bars, when we go 5, we put a dash on the top



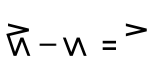
multiplication by zero is zero



1 0 is the same as four dashes



five dashes



visually obvious...

Sum the 20s (1+ 1=2) and then the unities: 2 + 4 is 1 bar plus 1 dash; this gives us 4 dashes, so one more 20 (+1 to the left) with 0 dashes. So the number is 3.1

The date will depend on when you are solving this problem. This problem was first used in April 2nd , 2011. As 2011 = 5.0.11, the date at that occasion was V : W : .

Basque Numbers

The following Basque numbers are identified straightforwardly:

2 bi	3 hiru	4 lau	5 bost
7 zazpi	9 bederatzi	10 hamar	20 hogei

Numbers from 11 to 19:	**hama-X | 10+X**	(where X is less than 10)
Numbers over 20:	**X-r-ogeita Y | X×20+Y**	(where Y is not greater than 20)

* In compounds 10 is hama (not hamar), 20 is hogeita (not hogei).

** The letter **h** in the beginning of the second word in a compound falls out (e. g., lau-r-hogeita > laurogeita).

bi × bi = lau	2 × 2 = 4
bi × bost = hamar	2 × 5 = 10
bi × hamar = hogei	2 × 10 = 20
hiru × bost = hamabost	3 × 5 = 15
hiru × hamar = hogeita hamar	3 × 10 = 30
bost × bost = hogeita bost	5 × 5 = 25
bost × zazpi = hogeita hama	5 × 7 = 35
bost zazpi × bederatzi = hirurogeita hiru	7 × 9 = 63
zazpi × hamar = hirurogeita hamar	7 × 10 = 70
lau × bost = **hogei**	4 × 5 = 20
bederatzi × hamar = laurogeita hamar	9 × 10 = 90

2.

a) 93

b) 60

3.

c) 39 = 20 + 19 hogeita hamabederatzi

d) 77 = 3×20 + 17 hirurogeita hamazazpi

e) 80 = 4×20 laurogei

Basque Kinship

The Basque sentences are formed in the following way:

Name1 – Name2 (genitive form) **– relationship – copular verb**.

The copula is **da** for singular subjects and **dira** for plural subjects. The genitive form (Mikel's, Kontxi's, ...) has the ending **-en** (after consonants), **-ren** (after vowels).

A woman's 'sister' is **ahizpa**, a man's 'sister' is **arreba**. Similarly, a man's 'brother' is **anaia**, a woman's 'brother' is **neba**. 'Wife' is **emaztea**, 'husband' is **senarra**. 'Spouses' (or 'married couple') is **senar-emazteak**, literally 'husband-wife-s'. **Seme-alabak** means 'children' (of different sexes, literally 'son-daughter-s'); **seme** is 'son'; therefore, **alaba** means 'daughter'. **Eta** means 'and'.

1.

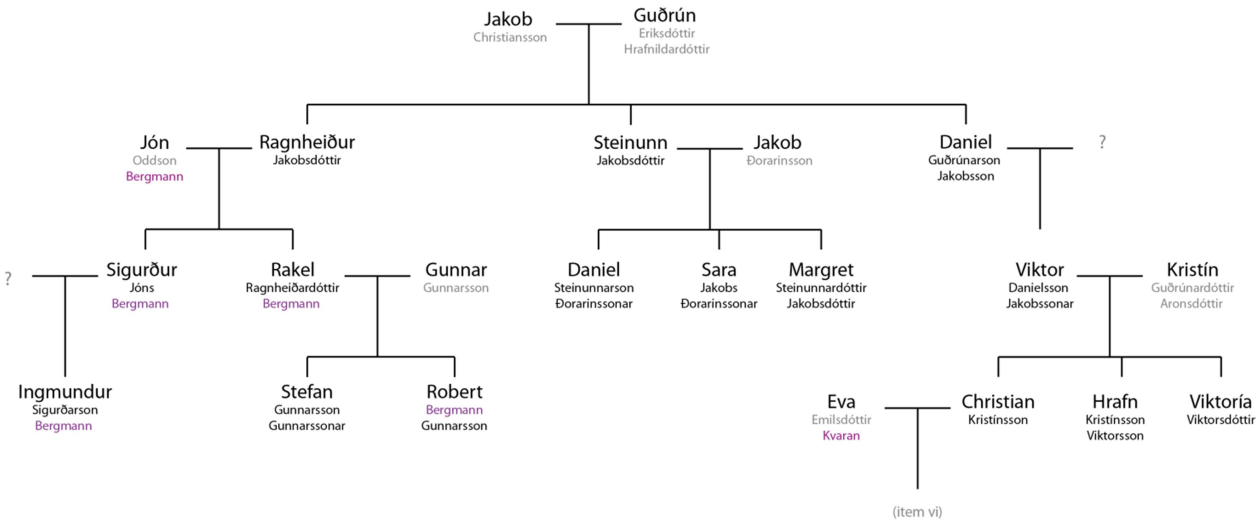
Ines is Mikel's wife.
Kontxi is Monika's sister.
Felix is Mikel's brother.
Andres is Emilio and Miren's son.

2. We know that Monika is ahizpa to Kontxi; therefore, Kontxi is female.

3.

a) Kontxi **Monikaren** ahizpa da.
b) Inma eta Manu Iboneren **seme-alabak dira**.
c) Ibone Andresen **arreba da**.
d) Manu Inmaren **neba da**.
e) Kontxi Mikelen **alaba da**.
f) Emilio **Mirenen** senarra da.

We can put all in a tree:



Thus we can answer the questions:

1. Jón Oddson Bergmann

2. Steinunn. She had three children: Daniel, Sara and Margret, none of them had children.

3. Three: Christian, Hrafn and Viktoria

4. Three: Daniel, Sara and Margret

5. Stefan Gunnarsson Gunnarssonar. He received only names of his father and his father's father.

6. Guðmundur (Evasson /Christiansson)(Emilsonnar /Kristínsonnar/Viktorssonar) (Kvaran)

7. Hrafnildur Björnsdóttir (Annassonar)

Manam

The ananlysis of the given examples suggests that *auta, ilau, ata,* and *awa* are the significant words, which probably represent directions. For reference, "*X pera kana*"means "X's house", and *ieno* means "is located."

We can see that *auta* and *ilau* appear to be opposed, and that *ata* and *awa* are also opposed. We thus hypothesize that they represent two axes of dimenstions, and we support this hypothesis by observing that their compounds are intermediate directions, such as *awa ilau* vs. *ata auta*, and *awa auta* vs. *ata ilau.* In fact, these compounds may occur in either order; for example, *ilau awa* and *auta ata* are also directions. *Ilau awa* is similar but not identical to *awa ilau*, in the same way as "north-north-west" is similar but not identical to "west-north-west."

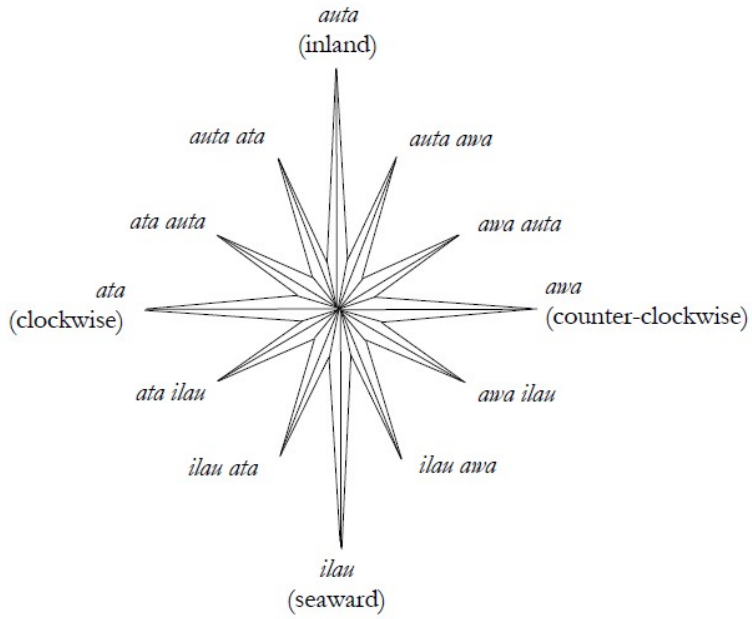
When we analyze the relative locations of the houses of Onkau, Kulu, and Mombwa, we may be tempted to assume that *auta* is North, *ilau* is South, *awa* is East, and *ata* is West. This assumption works until about halfway through the problem, but then we should notice contradictions: either these directions are very imprecise or some houses are in the sea.

When we reach a contradiction, we should try discarding some of the underlying assumptions; in this case, we discard the assumption that the islanders reckon the traditional directions, that is, North, South, East, and West. Instead, we should consider other directional possibilities that may occur to the islanders.

In fact, *auta* means "inland" or "upland," which is the same thing on a cone-shaped volcanic island, and *ilau* means "seaward." Furthermore, *Ata* means "clockwise around the island," and *awa* means "counterclockwise". The compound direction *awa auta* thus means "inland in a counterclockwise direction".

An alternative approach to solving this problem is as follows. We may be fairly certain that the directions form two axes, *auta/ilau* and *ata/awa*. Instead of placing islanders on the given map, as soon as we have a hunch where they live, we can work out an abstract two-dimensional map indicating the relative locations of the houses.

Then, by comparing it to the given map, we can see that the only way to reconcile the two maps is to "wrap" the abstract map around the island, that is, to curve the Cartesian grid of houses into a polar grid centered on the volcano.



Note that some of the directions are irrelevant to the problem, and we have included them only for completeness. Also note that the angle between *auta* and North depends on a specific location, which means that this compass would rotate with respect to the traditional North/South compass as we walk around the island.

If you have solved this difficult problem, you are probably able to examine and revise your initial assumptions, which is an essential research skill.

1.

A: **Pita** B: **Butokang** C: **Sulung** D: **Tola** E: **Sala**

2.

i. **Arongo pera kana ilau ieno, Butokang pera kana auta ieno.**
ii. **Arongo pera kana ata ieno, Pita pera kana awa ieno.**
iii. **Arongo pera kana awa ilau ieno, Sulung pera kana ata auta ieno.**

Guaraní

The Guarani verb consists of:

a. prefix ***n(d)(a)-***, if negation exists;
b. person and number of the subject: ***a-*** 'I', ***o-*** 'he', ***ja-*** 'we', ***pe-*** 'you (pl.)';
c. root;
d. ***-(r)i***, if negation exists;
e. ending ***-ma*** for past tense or ***-ta*** for future tense.

where:

- the negative prefix should start with ***n*** (rather than ***nd***) in case the root of the verb contains any nasal sound
- the vowel ***a*** is dropped from the negative prefix in case the personal prefix starts with a vowel.
- if a future tense is to be negated, the suffix is ***-mo'ãi,*** rather than **-(r)i-ta*; the negative suffix is *-ri* after the vowel *i; -i* otherwise.

1.	**2.**
a) I was eating	f) ne-pe-mbokapu-i
b) He will be waking up	g) ndo-purahei-ri
c) I will not be taking	h) ja-karu-ta
d) you are not crying	i) nda-purahei-mo'ai
e) I wasn't catching	

Aymara

1.

g	1	
b	2	**(lie!)**
a	3	
c	4	
d	5	
f	6	
e	7	

We need to notice the following patterns in order to solve this problem:
• *challwataxa* is the last word of each sentence, which may mean "caught" or "fished."
• *mä, paya,* and *kimsa* are the numbers.
• *challwa* is the root "fish."
• *–lla* indicates the little fish, whereas *hach'a* indicates the big fish.
• *–mpi* occurs whenever there are two kinds of fish.
• *–wa* occurs at the very end, but before *challwataxa*.

2. There are two possible correct answers:

Kimsa challwalla paya hach'a challwampiwa challwataxa.
Paya hach'a challwa kimsa challwallampiwa challwataxa.