First International Olympiad in Theoretical, Mathematical and Applied Linguistics
8–12 September 2003, Borovetz, Bulgaria
Individual Contest

Problem 1 (20 marks)

In 1916 the Russian scholar Jacob Linzbach invented a universal writing system, which he thought should be understandable to all people, regardless of their native tongue. Linzbach called his new language ‘Transcendental Algebra’.

Several sentences have been written in Linzbach’s language and translated into English:

1. \( \frac{\land \mathfrak{A}}{\mathfrak{A}} + \frac{\mathfrak{A}}{\mathfrak{A}} \ll \) The father and the brother are talking.
2. \( n(> \mathfrak{I}) = 0 \rightarrow t \) The giants are working without haste.
3. \( \frac{\mathfrak{A}}{\mathfrak{A}} \ll \ll \mathfrak{A} \) The orphans are writing a letter.
4. \( \ll \mathfrak{I} \ll - t = \mathfrak{I}_2 \) It wasn’t us who wrote about you (sg.).
5. \( \boxtimes \sqrt[n]{\ll} - t = -\mathfrak{A}_3 \) It was not by that the letter was written.
6. \( \frac{\mathfrak{A}}{\mathfrak{A}} \ll \ll = \mathfrak{I} \) The father doesn’t like the work.
7. \( (\mathfrak{I} - \bowtie) = 0 - t = \frac{\mathfrak{A}}{\mathfrak{A}} \) The wicked giant ate the parents.
8. \( \mathfrak{A}_3 \ll t \) She is not in a hurry.

Assignment 1. Translate into English:

9. \( \mathfrak{I}_3 \ll \sqrt[n]{\ll} \)

10. \( \frac{\mathfrak{A}}{\mathfrak{A}} \ll \ll ) + t = \frac{\mathfrak{A}}{\mathfrak{A}} + \frac{\mathfrak{A}}{\mathfrak{A}} \)

11. \( \mathfrak{A}_2 \ll t \ll - t \)

12. \( \boxtimes \sqrt[n]{\ll} - t = \frac{\mathfrak{A}}{\mathfrak{A}} - \bowtie \)

Assignment 2. Write in ‘Transcendental Algebra’:

13. It wasn’t about them that my husband and I (say: I and the husband) talked.
14. The people are working reluctantly.
15. The good widow loves the unemployed dwarf.
16. You (pl.) will be talked about.

Explain your solution. (Ksenia Guillianova)
Problem 2 (25 marks)

Below you see arithmetic equalities written in Egyptian Arabic\(^1\). All summands, as well as all sums except the last one, are represented as fractions in which neither the numerators nor the denominators are greater than 10, nor is any denominator equal to 1:

\[
\begin{align*}
tunn + tun\dot{m}\dot{\kappa}n &= tal\dot{a}t \ i\dot{m}\dot{\kappa}n \quad (1) \\
sah\dot{a}t \ il\dot{\hbar}l + suds &= sa\dot{a}rt \ il\dot{\hbar}l\dot{s}v \quad (2) \\
tuss\ddot{e}n + tus\ddot{e} &= sud\dot{e}n \quad (3) \\
zamast \ iz\dot{m}\dot{\alpha}s + sub\ddot{e} &= t\ddot{a}m\dot{a}nt \ is\dot{\hbar}l\dot{s}v \quad (4) \\
sub\dot{e}n + xams\dot{e}n &= \frac{24}{35} \quad (5)
\end{align*}
\]

Assignment 1. Write these equalities in figures.

Assignment 2. The equality \(rub\ddot{e} + sa\dot{a}rt \ is\dot{\hbar}l\dot{s}v = sa\dot{a}st \ is\dot{\hbar}l\dot{s}v\) is missing a sign. Which one?

Note: The letter \(\dot{s}\) is pronounced as English sh, as the ch in lock; \(\dot{\hbar}\) is a specific Arabic consonant. A bar above a vowel indicates length. (Ivan Derzhanski)

Problem 3 (15 marks)

Consider the following expressions in Basque\(^2\) and their unordered English translations (some words have been left out):

\textbf{urtarrilaren hegoita hirugarrena, larumata; abenduaren azken astea;}
\textbf{otsailaren lehenengo osteguna; ekainaren bideratzigarrena, igandea;}
\textbf{abenduaren lehena, ________; irularen azken asteazkena;}
\textbf{azamaren hirugarren ostirala; urriaren azken larumata;}
\textbf{irularen lehena, astelehena, ________ bigarrena, ostirala.}

\textbf{the first Thursday of February; the last Wednesday of ________; the first of December,}
\textbf{Wednesday; the last ________ of December; the ninth of June, Sunday; the twenty-
third of January, ________; the last Saturday of October; the third Friday of November;}
\textbf{________ of September; Monday; the second of January, Friday.}

Assignment 1. Match up the expressions with their translations and fill in the gaps.

Assignment 2. Translate into Basque:

\textbf{the first Monday of December; the twenty-ninth of November, Saturday; the second
week of January; the third of February, Monday.}

Assignment 3. How do you think the Basque names of days of the week astelehena, asteazkena, asteartea might be translated literally? (Alexandre Arkhipov)

\(^{1}\)The Egyptian dialect of the Arabic language is spoken by about 45 million people. Thanks to Egypt’s considerable economic, political and cultural influence and most of all to the great quantity and popularity of its radio and television programmes, this dialect is also widely understood by speakers of other Arabic dialects.

\(^{2}\)Basque is spoken by more than 300 thousand people in Basque Country (an autonomous province of Spain) and in France. It has not been proven to be related to any other language.
Problem 4 (20 marks)

Several sentences in Adyghe² are written in a simplified romanisation and accompanied by their English translations:

1. șangýr hakam deço. He puts the kettle into the stove.
2. syla laka m tyriçorn. What does he throw onto the plate?
3. ağa sa pyawɔnty m tyrenaf. He drops the money onto the chest.
4. șyanwar rənɔ m tyrenaf. He puts the cauldron onto the table.
5. syla pyɔmtaʃək m ʃaʃafarə. What does he drop under the stool?
6. laʃər tyda ʃiʃəncorə? Where does he put the plate?
7. laʃər tyda zytəriçorn? Where does he throw the plate?

Assignment 1. Offer more precise translations of sentences 6 and 7 (even if they don’t sound quite so natural in English).

Assignment 2. Translate into English:

8. pyɔmtaʃək hakam deço.
9. ağa sa tyda ʃiʃəncorə?

Assignment 3. Translate into Adyghe:

10. He puts the plate under the kettle.
11. What does he throw under the chest?
12. What does he drop into the cauldron?

Assignment 4. Translate into Adyghe in all possible ways:

13. Where does he put the table?

Note: Է, Ծ, Կ, Ո, Տ, Ի, Ո Ծ Ծ are specific consonants, ա and ը are vowels of the Adyghe language.

(Yakov Tsetelets)

²The Adyghe language is of the Aibkhan-Adyghean (North West Caucasian) language family. It is spoken by over 300 thousand people, mostly in the Republic of Adyghe (Russian Federation).
Problem 5 (20 marks)

The table below contains French verbs with prefixes and the corresponding verbs without prefixes, along with the English translations of all. The shaded cells mean that there is a prefixed verb there with no prefixed counterpart. In some verbs the prefixes have been left out.

<table>
<thead>
<tr>
<th>French Verb</th>
<th>English Verb</th>
<th>French Verb</th>
<th>English Verb</th>
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<td>react</td>
<td>_assortir</td>
<td>pick</td>
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<tr>
<td>_assortir</td>
<td>pick again</td>
<td>assertir</td>
<td>pick</td>
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Assignment. Fill in the gaps using information from the table. Explain your solution.

(Boris lomdin)