



en

2023 International Linguistics Olympiad - Taiwan

First Round Individual Contest

11 February 2023

Problems

- Listen carefully to the invigilators and follow their instructions.
- The contest lasts three hours. The problem set consists of six pages and it contains five problems. You may solve the problems in any order.
- You are not allowed to use any electronic devices, written or printed material or other external sources of information during the contest.
- If you have a question about any of the problems, put up your hand and ask an invigilator. The invigilator will consult with the jury before answering.
- Rules for writing out solutions:
 - Do not copy the statements of the problems.
 - Unless stated differently, you do not need to describe any patterns or rules that you identified in the data.

Problem#1 (20 points). The Catalan numbers are a sequence, and the following are the values of the first ten terms (C_0, C_1, \dots, C_9) of the sequence:

1, 1, 2, 5, 14, 42, 132, 429, 1430, 4862

The following are the first ten terms of the Catalan numbers in Kharosthi numerals in arbitrary order:

μ	$\mu\gamma\gamma\gamma$
$\mu\gamma\gamma$	$\gamma\gamma\gamma\mu$
$\gamma\mu\gamma\gamma\mu$	$\mu\gamma$
μ	$\mu\gamma\gamma\gamma\mu\mu\mu\mu$
$\gamma\mu$	μ

* All numbers in this problem are greater than 0 and less than 5000.

- (a) Determine the correct correspondences.
- (b) Write the following equalities into Arabic numerals:

1. $\mu \times \gamma\gamma\gamma\gamma\mu = \gamma\mu$
2. $\mu\mu\gamma\gamma + \mu\gamma\gamma\gamma\mu\mu\mu = \mu\mu\mu$
3. $\mu\mu\gamma\gamma\mu + \mu\mu\gamma\gamma\gamma\gamma = \mu\mu\mu$

- (c) Write out in Kharosthi numerals: 6, 97, 203, 580, 3711.

⚠ The Kharosthi script was an ancient script used in around present-day northern Pakistan and eastern Afghanistan, from 3rd century BCE to 3rd century CE.

The Catalan numbers are a sequence of natural numbers that occur in various counting problems in combinatorial mathematics. The formula of the n th term of the Catalan number is given by:

$$C_n = \frac{1}{n+1} \binom{2n}{n}, \text{ for } n \geq 0.$$

The formula is not related to solving this problem.

— 連子力

Problem#2 (20 points). Here are some sentences in Kuanua and their English translations (the numbers after pronouns indicate the number of people):

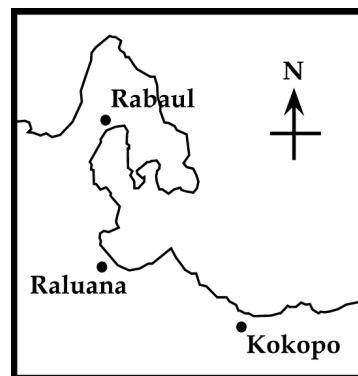
- | | |
|--|--|
| 1. Dir a pot maro Rabaul. | <i>They (2) will come from Rabaul.</i> |
| 2. Amur a vana. | <i>You (2) will go.</i> |
| 3. Avet a tata ra tinata tuna. | <i>We (excl.pl.) will speak the real language.</i> |
| 4. Kamumutal banam. | <i>Your (3) knife.</i> |
| 5. Datal tar tata. | <i>We (incl.3) spoke.</i> |
| 6. Kamumur mani. | <i>Your (2) money.</i> |
| 7. Kadatal pia. | <i>Our (incl.3) land.</i> |
| 8. Iau tar kul ra boroi ma kadia pem. | <i>I bought the pig and their axe.</i> |
| 9. Amital a kul ra buai ngalangala. | <i>We (excl.3) will buy the very large betelnut.</i> |
| 10. I na vana Raluana. | <i>He will go to Raluana.</i> |
| 11. Diat a nongon. | <i>They will laugh.</i> |
| 12. I tar kul ra banam tabu. | <i>He bought the sacred knife.</i> |
| 13. Iau ina nongon. | <i>I will laugh.</i> |
| 14. Dia tar tata. | <i>They spoke.</i> |
| 15. Ava tar pot. | <i>You (pl.) came.</i> |

(a) Translate into English:

16. **Amir a tata kada tinata.**
17. **Kaveve buai ma kadir mani.**
18. **Avat a kul ra boroi tabu.**
19. **Amutal tar vana maro Kokopo.**

(b) Translate into Kuanua:

20. *We (excl.pl.) laughed.*
21. *They (2) bought the very large land.*
22. *Our (excl.3) knife and your (pl.) axe.*
23. *He will come to Rabaul.*



⚠ Kuanua belongs to the Malayo-Polynesian branch of the Austronesian language family. It is spoken by approximately 100,000 Tolai people of Papua New Guinea, who live on the Gazelle Peninsula in East New Britain Province.

There is an inclusive (including listeners) / exclusive (without listeners) distinction in first person dual, trial and plural in Kuanua.

— 林建志

Problem#3 (20 points). Here is the Nüshu article *Hu Chizhu's Complaints* transcribed in Chinese characters:

青年女權提高了，老年女權提不高，生產不能出工作，1. 田中有水腳小了。想起以前舊社會，受盡壓迫好可憐。父母包辦受壓迫，纏腳本是大不該。生產努力做不得，2. 害了女身一世人。3. 出嫁憑夫受壓迫，重男輕女不平均。多少女人命薄死，多少終身血淚流。..... 青年女權提高了，男女平望一樣高。4. 我村有個義玉菊，5. 參加一個黨團員。是樣工能代頭掌，培養好多青年團。望起玉菊去開會，6. 確像神仙女下凡。..... 幾時轉回十八歲，參加革命報夫仇。民國二十六年抽我夫，7. 同父所生親三條，一抽兩個上戰場。幼子徵兵合了格，長子募兵退到來。九月初三起身去，放下房前伯母身。子亦小來女亦幼，千般事情依哪人。丈夫當兵到遠府，8. 不知陽身幾時回。亦沒田地吩咐我，伯母吃飯靠何人。透夜想來無路走，三條路中行哪賸。9. 亦想將身尋 * 短路，亦氣命中不盡頭。抖散子女行歸步，豈捨離開我女兒。不比年輕十八歲，年終將來三十三。10. 是我可憐今難氣，腳踏船邊一字難。面前 * 亦沒乘涼樹，11. 背底又沒解交人。十八年前受盡苦，如今想起好傷心。手拿鋼筆批書字，12. 思想行文到北京。

Here are sentences written in Nüshu, excerpted from the *Hu Chizhu's Complaints*:

A	B	C	D	E	F	G	H	I	J	K	L
禾 香 如 个 个 汪 夕	果 个 又 申 ノ 心 人	治 又 听 作 甜 夕 夕	人 求 神 氏 又 个 森	田 申 后 小 系 个 个	果 和 江 又 王 白 章	水 和 求 申 个 治 治	个 个 系 申 夕 夕 夕	夕 治 个 求 夕 姓 氏	夕 姓 思 夕 求 夕 白	治 系 ノ 个 治 治 夕	田 果 个 个 森 夕 人

- (a) Determine the correct correspondences.
 (b) Write in Chinese characters (write down all possible answers).

13. 神
14. 人
15. 首
16. 采

(c) Write in Nüshu. (Write down all possible answers.)

17. 小
18. 有
19. 我
20. 個

(d) Here is another sentence from the *Hu Chizhu's Complaints*.

21	22
采	神
首	采
人	人
神	神
人	人
采	神

Write in Chinese characters. (The answer can be found in the given text.)

* No additional explanation besides the answers is required, nor will be marked. The character ‘尋’ and ‘前’ marked with asterisks indicate that these semantically matched Chinese characters are etymologically unrelated, which is irrelevant to solving this problem. Knowledge of Mandarin Chinese is not required to solve this problem.

⚠ Nüshu is a writing system for Chinese languages. It is a script exclusively used by women, originated in Jiangyong County in southern Hunan Province, China, and is generally used to write the local dialect. Due to severe damage during the Cultural Revolution, and factors such as population outflow, Nüshu is now on the verge of extinction. The last person proficient in this writing system died in 2004.

— 陳君瑋

Problem#4 (20 points). Here are some sentences in Koorete and their English translations:

- | | |
|--|---|
| 1. Yoodiko u yese. | <i>They have come.</i> |
| 2. Hamako ta hangitsha. | <i>I used to go.</i> |
| 3. Wontoi siittako e siine. | <i>The God listens.</i> |
| 4. Gadhesa handiko hi yetsha. | <i>You (pl.) had gone to the market.</i> |
| 5. Dana woongiyako ta yetsha. | <i>I was buying beer.</i> |
| 6. Kana woomako ne woongitsha. | <i>You (sg.) used to buy the dog.</i> |
| 7. Doroi waatse ushiyako e yese. | <i>The sheep is drinking water.</i> |
| 8. Olo garma beettako e beetsha. | <i>He used to see the lion before.</i> |
| 9. Garmai atsho muuttako e muune. | <i>The lion eats meat.</i> |
| 10. Hatte gadhesa hangiyako e yese. | <i>He is going to the market right now.</i> |

(a) Translate into English:

11. **Wonto siidiko ta yese.**
12. **Waatse beeyako e yetsha.**
13. **Garmai dana ushiyako e yetsha.**
14. **Doro beediko hi yetsha.**

(b) Translate into Koorete:

15. *You (sg.) had bought the sheep before.*
16. *The dog comes.*
17. *They used to eat meat.*
18. *You (pl.) are listening to the lion right now.*

⚠ Koorete is a language belonging to the Omotic branch of the Afro-Asiatic language family. It is spoken by about 100,000 people in the southwestern part of Ethiopia.

— 黃日昇

Problem#5 (20 points). Here are some words in Czech and simplified transcriptions of their pronunciation in normal speech:

1. proč	[protʃ]	11. výzev	[vizɛf]
2. stůl	[stu:l]	12. chuť	[xuc]
3. restaurace	[restauratse]	13. domů	[domu:]
4. tři	[tɾi]	14. vkład	[fklat]
5. nádraží	[na:drazi:]	15. líný	[li:ni:]
6. chalupa	[xalupa]	16. úkol	[u:kol]
7. sešit	[seʃit]	17. rychlý	[rixli:]
8. jídlo	[ji:dlo]	18. d'ábel	[ja:bel]
9. muž	[muʃ]	19. kdo	[gdo]
10. úterý	[u:teri:]	20. hezký	[ɦeski:]

(a) Write down how the following words and phrases are pronounced.

21. **kovy**
22. **večeře**
23. **odpoledne**
24. **obchod**
25. **lod'ka**

(b) Write down the corresponding Czech word. (Write down all possible spellings, regardless of whether the spelling is an actual Czech word or not.)

26. [mlɛ:ko]
27. [zvʊ:lɛ]
28. [u:ɽʃastnitse]
29. [novɪɪ]
30. [mi:t]

⚠ Czech belongs to the Slavic group of the Indo-European language family. It is spoken by over 10,000,000 people in the world. Most of its speakers live in the Czech Republic.

Czech consonants letters are divided into three categories—the soft: **ch, d, g, h, k, n, r, t**, the hard: **c, č, d', j, ň, ř, š, ť, ž**, and the neutral: **b, f, l, m, p, s, v, z**. [c] [x] are voiceless consonants. [r] [ɾ] [j] [ɦ] are voiced consonants. [:] indicates that the preceding consonant or vowel is long.

— 陳柏文

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