

Вопрос **Инфо**

Welcome to the contest! You will have two tasks: one to test your reasoning and one to analyze language data. Read the instructions carefully and provide clear answers.

The tasks are in English, but you can answer in **Russian** if you prefer.

Take your time and do your best. Good luck!

Вопрос **Инфо**

Уважаемые участники!

Олимпиадное задание по этому направлению состоит только из инвариантной части. Это означает, что вам нужно постараться решить все задачи и ответить на все вопросы, чтобы претендовать на призовые места.

Все задания выполняются в этой системе: решения вносите в специальное поле для ответов.

Использование сторонних ресурсов и справочных материалов строго запрещено.

Верим в ваш успех!

Вопрос **1**

Балл: 40

**Canon**

Девушка пела в церковном хоре

А. Блок

Inter arma silent leges

Marcus Tullius Cicero

For the purposes of re-education, n dissidents have been sentenced to sing the anthem in a choir. More specifically, they sing in a canon. Singing in a canon means they start at different times but must recite

Lingvistika---teoriya-yazyka

exactly the same text. The anthem is infinite. The convicts are not experienced in singing in canon, so all sing at their own pace. The pace is a random real value from zero to one word per second.* If one person catches up with any other person on the text, they start singing in unison, i.e. the former (the quicker singer) switches to the singing pace of the latter (the slower singer). By catching up we understand being exactly in the same position in the text of the anthem.

1. Prove that, after some time, the number of groups singing the anthem in unison will become fixed.
2. Calculate the expected number (expected value** of the number) of such groups.

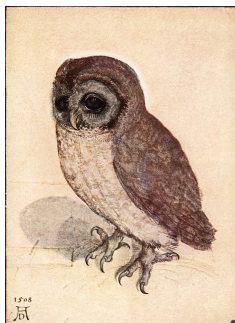
* A random variable that takes a real value from $[0;1]$ takes any specific value with the probability of zero. You may thus assume that none of the convicts has the pace of 0 or of 1, and there are no convicts whose pace of singing is equal to each other.

** Informally, the expected value is the mean of the possible values a random variable can take, weighted by the probability of these values. For a discrete probability distribution, it is calculated as the sum of productions of each of the values by its probability. For instance, if a dice has three faces marked as 0, one marked as 1, one marked as 2, and one marked as 3, and you get the money worth of the face that looks up when you throw the dice, the expected value of the number on the face after one throw equals $0 \cdot \frac{1}{6} + 0 \cdot \frac{1}{6} + 0 \cdot \frac{1}{6} + 1 \cdot \frac{1}{6} + 2 \cdot \frac{1}{6} + 3 \cdot \frac{1}{6}$ equals $1 \cdot \frac{1}{6} + 2 \cdot \frac{1}{6} + 3 \cdot \frac{1}{6}$ equals $\frac{6}{6}$ equals 1.

The task is in English, but you can answer in Russian if you prefer.

Вопрос 2

Балл: 60



Please, don't go! Negative commands across Daghestan

Мурка, не ходи, там сыч
На подушке вышит.
Мурка серый, не мурлычь,
Бабушка услышит!

А. Ахматова

Урхъиurgi Цилиши
Гандишмен вarti
Ун Цилиши ухъамчиш
Ис икIв орчIухъи

Арчинская песня

East Caucasian (Nakh-Daghestanian) languages differ in patterns of derivation of their synthetic verbal forms. Each form has a derivational base from which it is formed, but the number of derivational bases is specific to the language, and so is their mutual derivational relation.

By primary (unmarked) base we understand the base which is itself non-derived but derives other forms and, eventually, other bases. Archi has one primary base from which two other derivational bases are derived. Dargwa languages, e. g. Mehweb, have two primary bases. Avar has one primary base and one derived base. This is shown in Table 1 for the verb 'go', with one example of synthetic wordforms for a base. Underlying

forms are provided in //; the bases are boldfaced.

Table 1. 'go': bases			
Archi	<i>d-oq^f-mul</i> (primary) F- go -Nmlz 'her going'	<i>o<r>q^f-a -li</i> (derived) <F> go-Pfv -Cvb.Pfv 'being gone'	<i>d-o<r>q^f-ir -ši</i> (derived) F- <lpfv>go-lpfv -Cvb.lpfv 'going'
Mehweb	<i>r-u^fq^f-es</i> (primary) F- go:Pfv -Inf 'she went'	<i>d-aš-an</i> (primary) F-go:lpfv-Hab 'she uses to go'	
Avar	<i>a-na</i> (primary) go-Pst 'went'	<i>una</i> /a+ ^w na/ (derived) go.Hab 'uses to go'	

Table 1. Examples of derivational bases in East Caucasian languages

NB: Note that this description is a gross simplification. Not all East Caucasian languages are like that, and many of them show intermediate situations and contradictory evidence. Table 1 does not show all derivational bases for each language.

All available positive imperative (imperative proper) and negative imperative (prohibitive) forms of the same verb are provided in the following Table 2. Underlying forms are provided in //; imperative and prohibitive morphemes are provided for reference.

Table 2. 'go': imperative formation		
	positive imperative	negative imperative
Archi	<i>doq^fa</i> 'you (woman) go!' - a -Imp	<i>dorq^firgi</i> 'you (woman) don't go!' - gi - Proh
Mehweb	<i>ru^fq^fe</i> 'you (woman) go!' <i>raše</i> 'you (woman) go (many times)!' -e -Imp	<i>marasadi</i> 'you (woman) don't go!' <i>ma-...-adi</i> Proh
Avar	<i>a</i> /a+a/ 'you go!' -a -Imp	<i>unge</i> /unu+ge/ 'you don't go!' -ge -Proh

Table 2. Imperative formation in East Caucasian languages

1. Based on the provided data, suggest relevant generalizations / constraints on formation of negative and positive commands in Daghestanian languages.
2. Indicate your native language and other languages you know at a near native level. Try to think of evidence from one of the languages you know that is related to the generalization you made in 1.
3. Suggest a motivation for the generalization you made in 1.

Glosses: Aor – perfective past, Aux – auxiliary, Cvb – converb, F– feminine, Hab – habitual, Imp – imperative, Inf – infinitive, lpfv– imperfective base, N – neuter, Neg – negation, Nmlz– nominalization, Pfv – perfective base, Pst – past, Proh – prohibitive.

NB: You need to assume that glossing and morphological interpretation are correct. Alternative morphological analyses most probably will not help.

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