QOLDIQLI BO'LISHNING TAQQOSLAMA USULI

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ANNOTATSIYA

Ushbu maqolada qoldiqli bo'lishga doir misollarni yechishda taqqoslama usulidan foydalanishning afzalligi keltirilgan.

***Kalit so'zlar:** taqqoslama, daraja, qoldiq, Ferma teoremasi, xossa, bo'lish.*

METHOD OF COMPARISON WHEN DIVIDING WITH A REMAINDER

ABSTRACT

In this article presents the advantage of using the comparison method in solving residual problems.

***Key words:** comparison, degree, remainder, Fermat's theorem, property, share.*

Ayrim misollarda berilgan butun sonning yetarlicha katta darajasini boshqa butun songa bo'lgandagi qoldiqni topish talab etiladi. Agar bo'luvchi butun songa bo'linish belgisini qo'llash murakkab bo'lsa ushbu misolning yechimi o'quvchiga qiyinchilik tug'dirishi yoki ko'proq vaqt talab qilishi mumkin. Biz bu kabi misollarni yechishning arifmetik usuli hamda taqosslama usullarini yechishdagi farqni quyida solishtirish yo'li bilan keltiramiz.

1-misol. 17^{2849} sonni 13 ga bo'lgandagi qoldiqni toping.

1-usul: Arifmetik usuli

$$17^{2849} : 13 = (13+4)^{2849} : 13 = 4^{2849} : 13 = 2^{5698} : 13 \Rightarrow$$

$$\Rightarrow 2^{5694} \cdot 2^4 = 16 \cdot 2^{5694} = 16 \cdot (2^6)^{949} = 16 \cdot 64^{949} = 16 \cdot (65-1)^{949}$$

Bu yerda misolga c belgilash kiritamiz ya'ni $(65-1)^{949}$ ifodani (65c - 1) ifoda bilan almashtiramiz.

$16 \cdot (65c-1) = 16 \cdot 65c - 16$ ifodaga yangi o'zgaruvchi *d* ni kiritamiz $<16 \cdot 65c>$ ifoda $<16 \cdot 13 \cdot 5 \cdot c>$ bo'lganidan $<13 \cdot 80c>$ demak bu ifodani $<13d>$ bilan almashtirsak, yangi o'zgaruvchi *d=80c* ga tengligi kelib chiqadi.

$$13d - 16 = 13d - 13 - 3 = 13(d-1) - 3$$

bu ifodaga 13 ni qo'shib, ayiramiz, ya'ni

$$13(d-1) - 3 + 13 - 13 = 13(d-1) - 13 + 13 - 3 = 13(d-2) + 10$$

$$17^{2849} : 13 = (13(d-2) + 10) : 13$$

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dan qoldiqni 10 ekanligi kelib chiqadi.

Endi yuqoridagi misolni arifmetik usulda yechishga qaraganda ancha osonroq va nisbatan kamroq vaqt talab qiluvchi taqqoslama usulida yechishni keltiramiz.

2-usul: Fermaning kichik teoremasi

$$a^{p-1} = 1 (\bmod P)$$

ga ko'ra

$$17^{2849} : 13 \Rightarrow 17^{13^{-1}} = 1(\bmod 13) \quad 17^{12} = 1(\bmod 13)$$

$$(17^{12})^{237} = 1^{237}(\bmod 13) \quad 17^{2844} = 1(\bmod 13)$$

$$17^{2844} \cdot 17^5 = 1 \cdot 17^5 (\bmod 13)$$

Bunga ko'ra 17^5 ni 13 bo'lgandagi qoldiqni topish kifoya.

$$17 \equiv 4 (mod\ 13)$$

$$17^5 \equiv 4^5 (mod\ 13) \equiv 10 (mod\ 13)$$

2-misol. $93^{253} : 7$ qoldiqni toping.

1-usul: Berilgan misolni arifmetik usul yordamida yechamiz. $93^{253} : 7 = (13 \cdot 7 + 2)^{253} : 7 = 2^{253} : 7 = 2^3 \cdot 2^{250}$

yoki $2 \cdot 2^{252}$ ko'rinishida yozib olamiz.

$$2 \cdot 2^{252} = 2 \cdot (2^3)^{84} = 2 \cdot 8^{84} = 2 \cdot (7+1)^{84} \Rightarrow$$

$\Rightarrow$ bu tenglikda $2 \cdot (7+1)^{84}$ ifodani $2 \cdot (7c+1)$ ifoda bilan almashtiramiz, bu ifodani hadma-had ko'paytirib, $2 \cdot 7c + 2$ ifodaga ega bo'lamiz. Hosil bo'lgan $2 \cdot 7c + 2$ ifodani $7d + 2$ ifoda bilan almashtiramiz.

Bu erda d yangi o'zgaruvchi 2c qiymatni ifodalaydi. Xosil bo'lgan $7d + 2$ ifodadan ko'rinadiki qoldiq 2 ga teng. Demak, $93^{253} : 7 = ...$ (2 qoldiq).

2-usul: Ferma teoremasini esga olamiz.

$$a^{p-1} = 1 (\bmod P)$$

$$93^{7+1} = 1(\bmod 7) \qquad 93^6 = 1(\bmod 7)$$

$$(93^6)^{42} = 1^{42}(\bmod 7) \qquad 93^{252} = 1(\bmod 7)$$

$$93^{252} \cdot 93 = 93(\bmod 7)$$

$$93 : 7 = 13 \text{ (2 qoldiq)}$$

3-misol. 42^{50} ni 17 ga bo'lgandagi qoldiqni toping.

1-usul: $42^{50} : 17 = (2 \cdot 17 + 8)^{50} : 17 \Leftrightarrow 8^{50} : 17$

ifoda bilan almashtirsak bo'ladi.

$$8^{50} : 17 = (8^2)^{25} : 17 = 64^{25} : 17 = (3 \cdot 17 + 13)^{25} : 17 \Rightarrow$$

ifoda shu ko'rinishga keladi va

$8^{50} : 17 = (8^2)^{25} : 17 = 64^{25} : 17 = (3 \cdot 17 + 13)^{25} : 17 \Rightarrow$ ifodani $13^{25} : 17$ ifoda bilan almashtiramiz.

$$13^{25} : 17 = (17 - 4)^{25} : 17 \Rightarrow 4^2$$

$(17 - 4)^{25} : 17$ ifodaga c belgilash kiritamiz. $(17 - 4)^{25}$ ifodani $(17c - 4)$ ifoda bilan almashtirib qoldiqni hisoblaymiz.

$$(17c - 4) : 17 \Rightarrow (17c - 17 + 17 - 4) : 17 =$$
$$= (17(c - 1) + 13) : 17$$

ifodadan qoldiq 13 ekanligini aniqlaymiz.

2-usul: Ferma teoremasi yordamida qoldiqni topamiz.

$$42^{50} : 17 \Rightarrow 42^{16} = 1 (\mathrm{mod}\, 17) = (42^{16})^3 = 1^3 (\mathrm{mod}\, 17)$$

$$42^{48} = 1 (\mathrm{mod}\, 17) \qquad 42^{48} \cdot 42^2 = 1 \cdot 42^2 (\mathrm{mod}\, 17)$$

$$42^{48} \cdot 42^2 = 42^2 (\mathrm{mod}\, 17)$$

$42 \equiv 8 (mod\ 17)$

$42^2 \equiv 64 (mod\ 17) \equiv 3 (mod\ 17)$

Yuqoridagi misollardan ko'rinadiki berilgan butun sonning yetarlicha katta darajasini boshqa butun songa bo'lgandagi qoldiqni topishda taqqoslama usuli ancha qulaylik tug'dirar ekan, buning uchun o'quvchidan taqqoslama xossalarini va Ferma teoremasini bilishi talab etiladi xolos.

REFERENCES

1. James E. Gentle "Matrix algebra(2nd edition)" ,2017, Springer, ISBN 978-3-319-64867-5.

2. Mirzakarimova, N. M. (2022). FEATURES OF FORMATION OF STUDENTS'TECHNICAL THINKING ABILITIES WHEN CHOOSING THE CONTENT OF MATHEMATICAL EDUCATION IN ACADEMIC LYCEUMS. *Oriental renaissance: Innovative, educational, natural and social sciences*, *2*(12), 362-366.

3. Kodirov K., Nishonboev A., Mirzakarimova N. THE STUDY OF MATHEMATICAL HERITAGE OF AL-KHWARIZMI IN SECONDARY SCHOOLS// OF THE VII INTERNATIONAL SCIENTIFIC CONFERENCE CONFERENCE. MODERN PROBLEMS OF APPLIED MATHEMATICS

4. Мирзакаримова, Н. (2022). ТРИГОНОМЕТРИК АЙНИЯТЛАРНИ МАТЕМАТИК ИНДУКЦИЯ МЕТОДИ ЁРДАМИДА ИСБОТЛАШНИНГ АФЗАЛЛИГИ. BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI, 2(11), 431-435.

5. Kabulov, V. K. (2021). MINISTRY OF HIGHER AND SECONDARY SPECIAL EDUCATION OF THE REPUBLIC OF UZBEKISTAN NATIONAL UNIVERSITY OF UZBEKISTAN UZBEKISTAN ACADEMY OF SCIENCES VI ROMANOVSKIY INSTITUTE OF MATHEMATICS.

6. To'xtasinova, N. I. (2019). Psevdoqovariq sohalar va ularning xossalari. FarDU ilmiy xabarlar, 1(2), 111-112.

7. Yusupova, A. K., & Tokhtasinova, N. I. (2022). TYPICAL MISTAKES OF STUDENTS IN ANALYTICAL GEOMETRY AND DIAGNOSTICS OF THE CAUSES OF ERRORS. CURRENT RESEARCH JOURNAL OF PEDAGOGICS, 3(01), 1-8.

8. Akbarova, S., & To'xtasinova, N. (2022). IKKINCHI TARTIBLI EGRI CHIZIQ GIPERBOLANING AJOYIB XOSSALARI VA ULARNI MASALALAR YECHISHGA TADBIQI. BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI, 2(11), 424-430.