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Mavzu: Ko`rsatkichli ifodalar va logarifmik ifodalarni ayniy almashtirishlar.



Ko'rsatkichli va logarifmik ifodalarni ayniy almashtirishlar.

Oldingi darslarda logarifmning va logarifmik funksiyaning, shuningdek, darajaning va ko'rsatkichli funksiyaning xossalari bilan tanishgan edik. Bu xossalardan logarifmik va ko'rsatkichli ifodalarni shakl almashtirishlarda foydalaniladi.

1- misol. $3^{2+\log_3 2}$ ni hisoblang.

Yechish. $3^{2+\log_3 2} = 3^2 \cdot 3^{\log_3 2} = 9 \cdot 2 = 18.$

2- misol. $a^{\log_b c} = c^{\log_b a}$ ($a > 0, a \neq 1, b > 0, b \neq 0, c > 0$) tenglikni isbotlang.

Isbot. Logarifmning $\log_a b^p = p \cdot \log_a b$ ($a > 0, a \neq 1, b > 0, p \in \mathbb{R}$) xossasidan foydalansak, $\log_b a \cdot \log_b c = \log_b a \cdot \log_b c$ tenglikdan $\log_b (a^{\log_b c}) = \log_b (c^{\log_b a})$ tenglikni hosil qilamiz. Logarifmik funksiyaning monotonlik xossasidan $a^{\log_b c} = c^{\log_b a}$ ekanligi kelib chiqadi.



3- misol. $a^{\sqrt{\log_a b}} - b^{\sqrt{\log_b a}}$ ifodani soddalashtiring.

Yechish. $a^{\sqrt{\log_a b}}$ ifodada shakl almashtirish bajaramiz:

$$a^{\sqrt{\log_a b}} = a^{\frac{\log_a b}{\sqrt{\log_a b}}} = (a^{\log_a b})^{\frac{1}{\sqrt{\log_a b}}} = b^{\frac{1}{\sqrt{\log_a b}}} = b^{\sqrt{\log_b a}}.$$

Demak, $a^{\sqrt{\log_a b}} - b^{\sqrt{\log_b a}} = 0$.

4- misol. $A = \log_4 \frac{x^2}{4} - 2 \log_4 (4x^4)$ ifodani soddalashtiring va uning $x = -2$ dagi qiymatini toping.

Yechish. $\log_a b^{2n} = 2n \log |b|$ ($a > 0$, $a \neq 1$, $b \neq 0$, $n \in \mathbb{N}$)

bo'lgani uchun $\log_4 \frac{x^2}{4} = \log_4 x^2 - \log_4 4 = 2 \log_4 |x| - 1$ va $\log_4 (4x^4) = \log_4 4 + \log_4 x^4 = 1 + 4 \log_4 |x|$ tengliklar o'rinli.

U holda, $A = 2 \log_4 |x| - 1 - 2(1 + 4 \log_4 |x|) = -3 - 6 \log_4 |x|$. $x = -2$ bo'lsa, $A = -3 - 6 \log_4 |-2| = -3 - 6 \log_4 2 = -6$.



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Agar $\log_a 8 = 3$ va $\log_b 243 = 5$,

$a \cdot b$ ni toping ?

$$a^3 = 8$$

$$a^3 = 2^3$$

$$a = 2$$

$$b^5 = 243$$

$$b^5 = 3^5$$

$$b = 3$$

$$a \cdot b = 2 \cdot 3 = 6$$

1)4

2)5

3)6

4)8



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b ning qiymatini logarifmi bo'yicha toping

$$\lg b = \lg \log_7 343 - \lg 4$$

$$\begin{aligned} \lg \log_7 343 - \lg 4 &= \lg \log_7 7^3 - \lg 4 = \\ &= \lg 3 - \lg 4 = \lg \frac{3}{4} \end{aligned}$$

$$b = \frac{3}{4} = 0,75$$

1)3

2)-1

3)0,75

4)1



Hisoblang:

$$\begin{aligned} & 7^{\log_{49}(\sqrt{3}+3)^2} + 4^{\log_{16}(\sqrt{3}+3)^2} = \\ &= 7^{\log_{7^2}(\sqrt{3}+3)^2} + 4^{\log_{4^2}(\sqrt{3}+3)^2} = \\ &= 7^{\frac{2}{2}\log_7(\sqrt{3}+3)} + 4^{\frac{2}{2}\log_4(\sqrt{3}+3)} = \\ &= \sqrt{3}+3 + \sqrt{3}+3 = 2\sqrt{3}+6 \end{aligned}$$



**Ifodaning qiymatini
hisoblang:**

$$4^{2-\log_2 3}$$



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$$\begin{aligned} 4^{2-\log_2 3} &= 4^2 : 4^{\log_2 3} = 16 : 2^{2\log_2 3} = \\ &= 16 : 2^{\log_2 3^2} = 16 : 9 = \frac{16}{9} = 1\frac{7}{9} \end{aligned}$$

$$a^{\log_a b} = b$$

$$\log_a x^p = p \log_a x$$

$$a^x : a^y = a^{x-y}$$



Ifodani soddalashtiring:

$$\begin{aligned} & 6 \log_8 9 - 2 \log_2 3 = \\ & = 6 \log_{2^3} 3^2 - 2 \log_2 3 = \\ & = 6 \cdot \frac{2}{3} \log_2 3 - 2 \log_2 3 = \\ & = 4 \log_2 3 - 2 \log_2 3 = 2 \log_2 3 \end{aligned}$$

1) $2 \log_2 3$

2) $6 \log_2 3$

3) 6

4) $\log_2 3$