WHEN PERFORMING SOME COMPUTATIONS RELATED TO ARCFUNCTIONS $f(x) = arctg1 + arctg\left(1+\frac{1}{x}\right) + arctg(1+2x)$ APPLICATIONS OF THE FUNCTION VALUE FIELD

O. Makhmudova
senior teacher QDPI

Keywords: function, area of values, range, real number.

ANNOTATION

In this article $f(x) = arctg1 + arctg\left(1+\frac{1}{x}\right) + arctg(1+2x)$ theoretical information is provided about performing some calculations related to arcfunctions by applying the field of function values, and the necessary examples are solved.

First of all $f(x) = arctg1 + arctg\left(1+\frac{1}{x}\right) + arctg(1+2x)$ we find the area of values of the function.

The domain of definition of this function is all real numbers other than zero $D(f) = (-\infty;0) \cup (0;\infty)$

$f(x)$ value domain of the function $E(f)$ let's consider 5 cases of finding.

1) $\begin{cases} 1+\frac{1}{x} < 0 \\ 1+2x < 0 \end{cases}$

In this case $-1 < x < -\frac{1}{2}$ and $A(x) < 0$, in this $A(x) = arctg\left(1+\frac{1}{x}\right) + arctg(1+2x)$

$$tg\,A(x) = \frac{1+\frac{1}{x}+1+2x}{1-\left(1+\frac{1}{x}\right)(1+2x)} = \frac{2+2x+\frac{1}{x}}{-2-2x-\frac{1}{x}} = -1.$$

$2+2x+\frac{1}{x} < 0$ since $\left(-1;-\frac{1}{2}\right)$ all in the range x for lar

$A(x) = -\frac{\pi}{4}$; $\quad f(x) = arctg1 + A(x) = \frac{\pi}{4} - \frac{\pi}{4} = 0$

2) $\begin{cases} 1+\frac{1}{x} < 0 \\ 1+2x > 0 \end{cases}$

In this case $-\frac{1}{2} < x < 0$ and $B(x) > 0$ in this $B(x) = arctg1 + arctg(1+2x)$.

$$tgB(x) = \frac{1+1+2x}{1-1+(1+2x)} = \frac{2+2x}{-2x} = -\left(1+\frac{1}{x}\right)$$

and

$$B(x) = -arctg\left(1+\frac{1}{x}\right).$$

So $f(x)=arctg(1+\frac{1}{x})+B(x) = arctg(1+\frac{1}{x}) - arctg(1+\frac{1}{x})=0$

3) $\begin{cases} 1+\frac{1}{x}>0 \\ 1+2x<0 \end{cases}$

In this $x<-1$ va $C(x)>0$, in this $C(x)=arctg1+arctg\left(1+\frac{1}{x}\right)$

$$\text{tgC(x)}=\frac{1+1+\frac{1}{x}}{1-1\cdot(1+\frac{1}{x})}=\frac{2+\frac{1}{x}}{-\frac{1}{x}}=-(1+2x)$$

$tg\,C(x)=-arctg(1+2x)$.

So, $f(x)=C(x)+arctg(1+2x)=-arctg(1+2x)+arctg(1+2x)=0$

4) $f(-1)=arctg1+arctg\left(1+\frac{1}{-1}\right)+arctg(1+2(-1))=0$.

$$f\left(-\frac{1}{2}\right)=arctg1+arctg\left(1+\frac{1}{-\frac{1}{2}}\right)+arctg\left(1+2\cdot\left(-\frac{1}{2}\right)\right)=0$$

So $x<0$ da $f(x)=0$.

5) $\begin{cases} 1+\frac{1}{x}>0 \\ 1+2x>0 \end{cases}$

$D(x)=arctg\left(1+\frac{1}{x}\right)+arctg(1+2x)$,

$$tgD(x)=\frac{1+\frac{1}{x}+1+2x}{1-\left(1+\frac{1}{x}\right)(1+2x)}=\frac{2+2x+\frac{1}{x}}{-2-2x-\frac{1}{x}}=-1.$$

$(0;+\infty)$ in the range x for all values of

$2+2x+\frac{1}{x}>0$

$D(x)=\frac{3\pi}{4}$; $f(x)=arctg1+D(x)=\frac{\pi}{4}+\frac{3\pi}{4}=\pi$.

So, $x>0$ da $f(x)=\pi$.

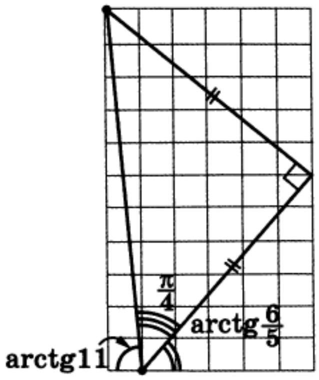
Now it is not difficult to find the area of values of a given function.

$E(f)=\{0;\pi\}$

Example. $f(5)$ we find the value of in 3 different ways.

Method 1. $5>0$ since uchu1n $f(5)=arctg1+arctg\frac{6}{5}+arctg11=\pi$.

Method 2. Look at the drawing.



Method 3. $arctg1=\frac{\pi}{4}$; $arctg11>0$, $arctg\frac{6}{5}>0$.

$tg(arctg1+arctg11)=\frac{1+11}{1-1\cdot 11}=-\frac{6}{5}$.

So

$arctg1+arctg11=\pi-arctg\frac{6}{5}$

and

$f(5)=arctg\frac{6}{5}+\pi-arctg\frac{6}{5}=\pi$

LITERATURE USED

1. Ergasheva, Hilola Muydinjonovna, Ozoda Yuldashevna Mahmudova, and Gavhar Ahadovna Ahmedova. "GEOMETRIC SOLUTION OF ALGEBRAIC PROBLEMS." Scientific and Technical Journal of Namangan Institute of Engineering and Technology 2.4 (2020): 3-8
2. Akhmedova, Gavkharkhon, and Makhmudova Ozodakhon. "TRIGONOMETRIK TENGLAMALARNI YECHISHNING NOSTANDART USULLARI." Nazariy va amaliy tadqiqotlar xalqaro jurnali 2.2 (2022): 40-50.
3. Axmedova, Gavhar, and Ozodaxon Maxmudova. "MURAKKAB ARGUMENTLI TRIGONOMETRIK TENGLAMALARNI YECHISH." Евразийский журнал математической теории и компьютерных наук 2.5 (2022): 18-20.
4. Умматова, М., Г. Ахмедова, and О. Махмудова. "Практическая направленность в обучении математике." Теория и практика современных гуманитарных и естественных наук. 2014.
5. Axmedova, G. "USING INEQUALITIES IN SOLVING TRIGONOMETRIC EQUATIONS AND SYSTEMS OF EQUATIONS." Open Access Repository 8.12 (2022): 224-229.
6. Davronovich, Aroyev Dilshod, and Axmedova Gavxar Axadovna. "ON THE ROOTS OF A QUADRATIC EQUATION DEPENDING ON A PARAMETER." Open Access Repository 8.12 (2022): 283-288.
7. Madraximov, Sh Sh, M. A. Ummatova, and G. A. Axmedova. "TENGLAMALARNI YECHISHNING BA'ZI SUN'IY USULLARI." Scientific Impulse 1.11 (2023): 624-629.

8. Gavhar, Ahmedova, and Meliboyeva Yulduzxon. "SOME THE EQUATIONS WITH RESPECT TO THE NEW VARIABLES SYSTEM OF EQUATIONS TO SOLVE." Galaxy International Interdisciplinary Research Journal 11.3 (2023): 291-299.
9. Ahmedova, G. "LOGARITHMIC INEQUALITIES CONTAINED OF VARIABLES SOME PROPERTIES USING INEQUALITIES SOLVING." Open Access Repository 9.3 (2023): 299-305.
10. Akhmedova, G., and O. Mahmudova. "EXPONENTIAL IN SOLVING EXPONENTIAL EQUATIONS USING THE FUNCTION PROPERTY." Confrencea 3.03 (2023): 215-218.
11. Mo, Axmedova Gavxar Axadovna Haydarova Shohista. "Logarifmik tengsizliklarni yechishning yana bir usuli haqida." Confrencea 3.03 (2023): 210-214.
12. Ахмедова, Г. А. "ЭТАПЫ ПРОЕКТИРОВАНИЯ СОВРЕМЕННОЙ ЛЕКЦИИ." E Conference Zone. 2022.
13. Akhadovna, Akhmedova Gavkhar, and Makhmudova Ozoda Yuldashevna. "Extreme Issues Related to Irrational Functions and Geometric Methods for Solving Equations." International Journal on Orange Technologies 3.5: 93-96.
14. Ergasheva, Hilola Muydinjonovna, Ozoda Yuldashevna Mahmudova, and Gavhar Ahadovna Ahmedova. "GEOMETRIC SOLUTION OF ALGEBRAIC PROBLEMS." Scientific and Technical Journal of Namangan Institute of Engineering and Technology 2.4 (2020): 3-8.
15. Туракулова, Феруза Аминовна, and Озода Юлдашевна Махмудова. "Технология организации и проведения внеклассных мероприятий в период педагогической практики." Инновационная экономика: перспективы развития и совершенствования 2 (5) (2014): 268-273.
16. Akhmedova, Gavkharkhon, and Makhmudova Ozodakhon. "TRIGONOMETRIK TENGLAMALARNI YECHISHNING NOSTANDART USULLARI." Nazariy va amaliy tadqiqotlar xalqaro jurnali 2.2 (2022): 40-50.
17. Устаджалилова, Хуршида Алиевна, Озода Махмудова, and Дилшод Султанов. "Особенности профессионально-педагогической подготовки выпускников-будущих учителей математики." Молодой ученый 3-1 (2016): 18-19.
18. Axmedova, Gavhar, and Ozodaxon Maxmudova. "MURAKKAB ARGUMENTLI TRIGONOMETRIK TENGLAMALARNI YECHISH." Евразийский журнал математической теории и компьютерных наук 2.5 (2022): 18-20.
19. Устаджалилова, Хуршида Алиевна. "Озода Махмудова, and Дилшод Султанов."." Особенности профессионально-педагогической подготовки выпускников-будущих учителей математики." Молодой ученый (2016): 3-1.
20. Махмудова, О. Ю. "МЕТОДЫ ОРГАНИЗАЦИИ ПРОБЛЕМНЫХ ЛЕКЦИЙ." Conferencea (2022): 45-51.
21. Maxmudova, O. "DRAWING UP EQUATIONS FROM THE PROPERTIES OF THE FUNCTIONS INCLUDED IN IT SOLVE WITH." Open Access Repository 8.12 (2022): 165-170.
22. Yu, Juraev Sh, and N. A. Makhmudova. "SOME REFINEMENTS OF THE LIMIT THEOREMS FOR GALTON-WATSON BRANCHING RANDOM PROCESSES." Open Access Repository 8.12 (2022): 268-276.

23. Mahmudova, O. Y. "Extracurricular And Elective Classes In Mathematics." International Journal of Innovative Research in Science, Engineering and Technology.
24. Akhadovna, Akhmedova Gavkhar, and Makhmudova Ozoda Yuldashevna. "Extreme Issues Related to Irrational Functions and Geometric Methods for Solving Equations." International Journal on Orange Technologies 3.5: 93-96.
25. Madinakhan, Makhmudova. "THE THEORETICAL SIGNIFICANCE OF THE DEVELOPMENT OF THE PROFESSIONAL COMPETENCE OF THE TUTOR OF A SPECIAL EDUCATIONAL INSTITUTION." Galaxy International Interdisciplinary Research Journal 11.11 (2023): 353-356.
26. Saule, Zhakipbekova, and Madinaxon Maxmudova Sobirxonovna. "DISRUPTION OF SPEECH, WHICH IS NOT VISIBLE IN RETARDATION OF MENTAL DEVELOPMENT." Academia Science Repository 4.7 (2023): 46-50.
27. Maxmudova, Madinaxon, and Iroda Xasanova. "DIZARTRIYA NUTQ BUZILISHI TOVUSHNING TALAFFUZ TOMONIDAN BUZILISHI SIFATIDA." Interpretation and researches 1.1 (2023).
28. Madinakhan, Makhmudova, and Rozmatova Odinakhan. "STAGES OF UPBRINGING AND DEVELOPMENT OF SPEECH-IMPAIRED CHILDREN IN THE FAMILY." American Journal of Interdisciplinary Research and Development 16 (2023): 33-37.
29. Sobirkhanovna, Makhmudova Madinakhan, and Yoldosheva Jumagul. "PROVIDING QUALITY EDUCATION IN THE PROCESS OF IMPROVING THE QUALITY AND EFFICIENCY OF EDUCATION-THE REQUIREMENT OF THE TIME." American Journal of Interdisciplinary Research and Development 16 (2023): 29-32.
30. Madinakhan, Makhmudova, and Khasanova Iroda. "SPECIFIC FEATURES OF DYSARTHRIA SPEECH DISORDER IN CHILDREN WITH SPEECH DEFICIENCY." American Journal of Interdisciplinary Research and Development 16 (2023): 42-45.
31. Shukhratovich, Makhmudov Khurshid, and Khomidova Shahribonu. "PEDAGOGICAL TASKS OF SPEECH THERAPIST AND PARENT COOPERATION IN ELIMINATING SPEECH DEFECTS." American Journal of Interdisciplinary Research and Development 16 (2023): 38-41.
32. Shukhratovich, Makhmudov Khurshid. "IMPORTANT ASPECTS OF COLLABORATIVE ACTIVITIES IN THE PROCESS OF INCLUSIVE EDUCATION." (2023).
33. Shukhratovich, Makhmudov Khurshid. "WAYS TO OVERCOME SPEECH DEFECTS IN THE EDUCATION OF PARALYZED CHILDREN." Galaxy International Interdisciplinary Research Journal 11.11 (2023): 348-352.