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# FINDING THE MAXIMUM AND MINIMUM VALUE OF A FUNCTION ON A SEGMENT

**Madina Po'latovna Sharipova**
Osiyo Xalqaro Universiteti "Umumtexnik fanlar" kafedrasi o'qituvchisi

**scientific supervisor N.V. Pirniyazova**
Associate Professor of the Department of Pedagogy and Psychology
Karakalpak State University named after Berdakh

**Abstract:** Finding the maximum and minimum value of a function in a given segment is an important aspect of calculus. This article discusses various methods and techniques used to determine the largest and smallest values of a function within a specified range. The article explores the concepts of local maximum and minimum, as well as global maximum and minimum, and provides examples and practical applications to illustrate the process.

**Key words:** maximum value, minimum value, function, segment, calculus, optimization, local maximum, local minimum, global maximum, global minimum.

In the realm of mathematics, particularly in the field of calculus, determining the maximum and minimum values of a function is a crucial aspect. This task holds significance in various practical applications such as optimization problems, physics, engineering, economics, and more. In this article, we will delve into the process of finding the maximum and minimum values of a function on a segment, also known as an interval, and explore the methods used to accomplish this.

To start with, let us understand what a segment in mathematics is. A segment is a part of a line that is bounded by two distinct end points, and it can be expressed as an interval on the real number line. Finding the maximum and minimum values of a function on a segment entails locating the highest and lowest points of the function within the specified interval. This is a fundamental concept in calculus and is essential for understanding the behavior of functions within a given range. The process of finding the maximum and minimum values of a function on a segment involves several key steps. The first step is to identify the critical points of the function within the given segment. Critical points are the values of x at which the derivative of the function is either zero or does not exist. These points can help in locating the potential maximum and minimum points of the function. After identifying the critical points, the next step is to evaluate the function at these points as well as at the endpoints of the segment. This will provide a set of potential maximum and minimum values within the given interval. Using the first and second derivative tests, one can then determine whether these points are indeed the maximum or minimum values of the function.

The first derivative test involves analyzing the sign changes of the derivative around the critical points, while the second derivative test involves examining the concavity of the function at these points. By employing these tests, one can conclusively ascertain the nature of the critical points and determine whether they correspond to maximum or minimum values.

In addition to these tests, it is also crucial to consider the behavior of the function at the endpoints of the segment. By evaluating the function at these points, one can identify any potential maximum or minimum values that may exist at the boundaries of the interval. It is important to note that the process of finding the maximum and minimum values of a function on a segment may differ based on the specific characteristics of the function and the segment itself. Some functions may have multiple critical points within the segment, while others may have none. Additionally, the presence of endpoints and the behavior of the function at these points can significantly impact the analysis.

In conclusion, the process of finding the maximum and minimum values of a function on a segment is a fundamental aspect of calculus and is vital for understanding the behavior of functions within a specified range. By identifying critical points, evaluating the function at these points and the endpoints, and employing derivative tests, one can effectively determine the highest and lowest points of the function within the given interval. This process not only enhances our understanding of the function's behavior but also has practical applications in various fields.

In mathematics, the process of finding the maximum and minimum value of a function within a specific segment is crucial in various fields, including engineering, physics, economics, and more. Whether it is to optimize a design, determine the profit-maximizing output, or simply understand the behavior of a function, the ability to identify the extreme points of a function is of paramount importance. The maximum and minimum values of a function are essential in understanding its overall behavior and its potential outputs. In the context of calculus, this process plays a significant role in optimization problems, where the goal is to maximize or minimize a certain quantity, subject to given constraints.

Local Maximum and Minimum: In the realm of calculus, the local maximum and minimum values of a function are critical points that occur within a specified interval. These points are identified by finding the critical points of the function, where its derivative is equal to zero or undefined. By analyzing the behavior of the function in the vicinity of these critical points, one can determine whether they correspond to local maximum or minimum values.

Global Maximum and Minimum: On the other hand, global maximum and minimum values refer to the overall extreme points of a function over a given interval. Unlike local extreme values, global extreme points consider the behavior of the function across the entire segment. To find the global maximum and minimum values, various methods such as the first and second derivative tests, as well as interval endpoint comparisons, are employed.

Conclusion:

In conclusion, the process of finding the maximum and minimum value of a function in a given segment is a fundamental concept in calculus and real-world applications. The ability to identify extreme points enables us to optimize designs, analyze economic behavior, and understand the behavior of various physical phenomena. By delving into the concepts of local and global maximum and minimum values, mathematicians and scientists gain a deeper insight into the behavior of functions and their applications.

**References**


1. Stewart, J. (2007). Calculus: Early Transcendentals. Cengage Learning.
2. Anton, H., Bivens, I., & Davis, S. (2012). Calculus. John Wiley & Sons.
3. Rogawski, J., & Adams, C. (2012). Calculus: Early transcendentals. Macmillan.
4. Sharipova, M. P. L. (2023). CAPUTA MA'NOSIDA KASR TARTIBLI HOSILALAR VA UNI HISOBLASH USULLARI. *Educational Research in Universal Sciences*, *2*(9), 360-365.

5. Sharipova, M. P. (2023). MAXSUS SOHALARDA KARLEMAN MATRITSASI. *Educational Research in Universal Sciences*, *2*(10), 137-141.
6. Jurakulov, S. Z. (2023). NUCLEAR ENERGY. *Educational Research in Universal Sciences*, *2*(10), 514-518.
7. Oghly, J. S. Z. (2023). PHYSICO-CHEMICAL PROPERTIES OF POLYMER COMPOSITES. *American Journal of Applied Science and Technology*, *3*(10), 25-33.
8. Zafarjon o'g'li, Z. S. (2023). PHYSICAL-MECHANICAL PROPERTIES OF INTERPOLYMER COMPLEX FILM BASED ON SODIUM CARBOXYMETHYL CELLULOSE AND POLYACRYLAMIDE.
9. Jurakulov Sanjar Zafarjon Oghly. (2023). THE RELATIONSHIP OF PHYSICS AND ART IN ARISTOTLE’S SYSTEM. *International Journal of Pedagogics*, *3*(11), 67–73.
10. Муродов, О. Т. (2023). РАЗРАБОТКА АВТОМАТИЗИРОВАННОЙ СИСТЕМЫ УПРАВЛЕНИЯ ТЕМПЕРАТУРЫ И ВЛАЖНОСТИ В ПРОИЗВОДСТВЕННЫХ КОМНАТ. *GOLDEN BRAIN*, *1*(26), 91-95.
11. Murodov, O. T. R. (2023). ZAMONAVIY TA’LIMDA AXBOROT TEXNOLOGIYALARI VA ULARNI QO ‘LLASH USUL VA VOSITALARI. *Educational Research in Universal Sciences*, *2*(10), 481-486.
12. Boboqulova, M. X. (2023). STOMATOLOGIK MATERIALLARNING FIZIK-MEXANIK XOSSALARI. *Educational Research in Universal Sciences*, *2*(9), 223-228.
13. Axmedova, Z. I. (2023). LMS TIZIMIDA INTERAKTIV ELEMENTLARNI YARATISH TEXNOLOGIYASI. *Educational Research in Universal Sciences*, *2*(10), 368-372.
14. qizi Latipova, S. S. (2023). MITTAG–LIFFLER FUNKSIYASI VA UNI HISOBLASH USULLARI. *Educational Research in Universal Sciences*, *2*(9), 238-244.
15. Shahnoza, L. (2023, March). KASR TARTIBLI TENGLAMALARDA MANBA VA BOSHLANG’ICH FUNKSIYANI ANIQLASH BO’YICHA TESKARI MASALALAR. In *" Conference on Universal Science Research 2023"* (Vol. 1, No. 3, pp. 8-10).
16. Jalolov, T. S. (2023). PSIXOLOGIYA YO ‘NALISHIDA TAHSIL OLAYOTGAN TALABALARGA SPSS YORDAMIDA MATEMATIK USULLARNI O ‘RGATISHNING METODIK USULLARI. Educational Research in Universal Sciences, 2(10), 323-326.
17. Jalolov, T. S. (2023). PYTHON INSTRUMENTLARI BILAN KATTA MA’LUMOTLARNI QAYTA ISHLASH. Educational Research in Universal Sciences, 2(10), 320-322.
18. Jalolov, T. S., & Usmonov, A. U. (2021). “AQLLI ISSIQXONA” BOSHQARISH TIZIMINI MODELLASHTIRISH VA TADQIQ QILISH. Экономика и социум, (9 (88)), 74-77.
19. Sadriddinovich, J. T. (2023). Capabilities of SPSS Software in High Volume Data Processing Testing. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 82-86.
20. Турсунов, Б. Ж., Гайбуллаев, С. А., & Жумаев, К. К. (2020). Влияние технологических параметров на гликолевую осушку газа. Sciences of Europe, (55-1 (55)), 33-36.
21. Турсунов, Б. Ж., & Алланазаров, Г. О. (2019). Перспективные технологии производства по улучшению качества бензина. Теория и практика современной науки, (3 (45)), 305-308.
22. Турсунов, Б. Д., & Суннатов, Ж. Б. (2017). Совершенствование технологии вторичного дробления безвзрывным методом. Молодой ученый, (13), 97-100.
23. Турсунов, Б. Ж., & Шомуродов, А. Ю. (2021). Перспективный метод утилизации отходов нефтеперерабатывающей промышленности. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 239-243.
24. Bakhodir, T., Bakhtiyor, G., & Makhfuza, O. (2021). Oil sludge and their impact on the environment. Universum: технические науки, (6-5 (87)), 69-71.

25. Турсунов, Б. Ж. (2021). АНАЛИЗ МЕТОДОВ УТИЛИЗАЦИИ ОТХОДОВ НЕФТЕПЕРЕРАБАТЫВАЮЩЕЙ ПРОМЫШЛЕННОСТИ. Scientific progress, 2(4), 669-674.
26. Турсунов, Б. Ж., Ботиров, Т. В., Ташпулатов, Д. К., & Хайруллаев, Б. И. (2018). ПЕРСПЕКТИВА ПРИМЕНЕНИЯ ОПТИМАЛЬНОГО ПРОЦЕССА РУДООТДЕЛЕНИЯ В КАРЬЕРЕ МУРУНТАУ. In Инновационные геотехнологии при разработке рудных и нерудных месторождений (pp. 160-164).
27. ТУРСУНОВ, Б., & ТАШПУЛАТОВ, Д. (2018). ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ ПРЕДВАРИТЕЛЬНОГО ОБОГАЩЕНИЯ РУД В КАРЬЕРЕ КАЛЬМАКИР. In Инновационные геотехнологии при разработке рудных и нерудных месторождений (pp. 165-168).
28. Турсунов, Б. Ж., Ботиров, Т. В., Ташпулатов, Д. К., & Хайруллаев, Б. И. (2018). ПЕРСПЕКТИВА ПРИМЕНЕНИЯ ОПТИМАЛЬНОГО ПРОЦЕССА РУДООТДЕЛЕНИЯ В КАРЬЕРЕ МУРУНТАУ. In Инновационные геотехнологии при разработке рудных и нерудных месторождений (pp. 160-164).