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DRAWING UP EQUATIONS FROM THE PROPERTIES OF THE FUNCTIONS INCLUDED IN IT SOLVE WITH

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ANATATION
In some cases, when solving equations, you have to use the properties of a function. In this case, the domain of the function, the properties of boundedness, monotonicity are used. In many cases, the use of the graph of the function can also help in solving equations.

Keywords: property of monotonicity, monotonic function, graph of a function, equation

From the domain of the function foydalanish.Ba ' in zi cases, knowing the domain of the equation requires proving that the equation has no root, and sometimes finding a solution to the equation by calculating a number from the domain.

one- example. $\sqrt{3-x} = \log_5(x-3)$ solve the equation.

Solution. Find the domain of the equation. $\begin{cases} 3-x \geq 0 \\ x-3 > 0 \end{cases}$

The scope is the empty set. So, if the equation has no root.

J: $\varnothing$.

2- example. $\sqrt{|\sin x|} = \sqrt[4]{-|\sin x|} + tgx$ (1) solve the equation.

Solution. Equation domain $\begin{cases} |\sin x| \geq 0 \\ -|\sin x| \geq 0 \\ x \neq \frac{\pi}{2} + \pi n; \quad n \in z \end{cases}$

comprises. From this $x = \pi k, \quad k \in z$. x substituting this value (1) into the equation, we see that its right and left sides are equal to 0. So, all $x = \pi k; \quad k \in z$ lar are still the root of the equation.

J: $x = \pi k; \quad k \in z$.

2. Using the property of boundedness of a function.

When solving equations, a large role in most cases is played by the property of a function to be bounded from below or above on the set. For example, if M everything in the collection x is for lara $f(x) > A$ and $g(x) < A$ (A number) if the inequalities are relevant, then M in the collection $f(x) = g(x)$ in the collection $f(x) < g(x)$ the inequality has no solution. A the number in place is zero in many cases, which is $f(x)$ the va $g(x)$ of the function M indicating that the hint will be stored in the collection.

3- example. $\sin(x^3 + 2x^2 + 1) = x^2 + 2x + 3$ solve the equation.

Solution. For an arbitrary real number $\sin(x^3 + 2x^2 + 1) \leq 1$. $x^2 + 2x + 3 = (x+1)^2 + 2 \geq 2$. From this we see that for an arbitrary real number the left side of the equation does not exceed 1, and the right side is always not less than 2. So, it turns out that the equation has no solution.

four- example. $x^3 - x - \sin \pi x = 0$ (2) solve the equation.

Solution. As you can see $x=0$, $x=1$, $x=-1$ the equation will be solved. To find the rest of its solutions $f(x) = x^3 - x - \sin \pi x$ from the oddness of the function, $x>0$, $x \neq 1$ it is enough to find a solution in the field. If x_0 if he has a solution, then $(-x_0)$ so will his solution. $x>0$, $x \neq 1$ We divide the set into 2 intervals. (0;1) AND (1; ∞). (2) $x^3 - x = \sin \pi x$ we write the equation in appearance. (0;1) in the range, $g(x) = x^3 - x$ the function takes only negative values. $h(x) = \sin \pi x$ however, the function takes positive values. So, in this range (2) the equation has no solution. $x \in (1;+\infty)$ let it be. In each value of this range, $g(x) = x^3 - x$ the function is positive, $h(x) = \sin \pi x$ on the other hand, the function takes on different hint values. $(1;2]$ in the range $h(x) = \sin \pi x$ the function is not positive. Therefore, equation (2) has no solution in the interval. If $x > 2$ if, then $|\sin \pi x| \leq 1$, $x^3 - x = x(x^2 - 1) > 2 \cdot 3 = 6$. From this $(2;\infty)$ also in the range (2) the equation has no solution. So only $x=0$, $x=1$ va $x=-1$ lar is a solution to this equation. J: $x_1 = 0$, $x_2 = 1$, $x_3 = -1$.

3. Using the monotonicity property of a function.

The use of the monotonicity property of a function in solving equations and inequalities is based on the following statements:

one. $f(x)$ I let be a continuous and strictly monotonic function in space, then $f(x) = c$ $(c = const)$ the equation will have one solution in the interval.

2. $f(x)$ va $g(x)$ let the functions be continuous functions in space, $f(x)$ strictly increasing in this range, $g(x)$ let it be strictly decreasing. Then $f(x) = g(x)$ the equation will have one solution in the interval. as intermediate ($-\infty;\infty$), $(a;+\infty)$, $(-\infty;a)$, $[a;+\infty)$, $(-\infty;b)$ we can get intervals, cross sections, intervals and half cycles.

5 is an example. $x \cdot 2^{x^2+2x+3} = 64$ (3) solve the equation.

Solution. $x \leq 0$ It can be seen that the equation has no solution c. $x>0$ for $y = x \cdot 2^{x^2+2x+3}$ the function is continuous and strictly increasing, because it is $f = x$ also $g = 2^{x^2+2x+3}$ the product of two continuous positive strictly increasing functions. $x=1$ (3) we see that this is a solution to the equation, which means that this is the only solution. J: $x=1$.

6-misol. $\log_2(|x-1|+1) + \sqrt[3]{(x-1)^4} = 2$ (4) solve the equation.

Solution. (4) $\log_2(|x-1|+1) = 2 - \sqrt[3]{(x-1)^4}$ we write the equation in appearance. $f(x) = \log_2(|x-1|+1)$ va $g(x) = -\sqrt[3]{(x-1)^4} + 2$ look functions. $f(x)$ f oz $(-\infty;1]$ oraliqda kamayadi and grows in between. on the other hand, the function decreases in the interval and increases in the interval. in the interval the function increases, the function decreases. Therefore, in this interval, the equation has at most one root. It's easy to check if it's a root. in the interval the function decreases, the function grows. Therefore, in this interval, the equation again has at most one root. One can easily check if this is a root.Demak, berilgan tenglama 2 ta ildizga ega $x_1 = 0$, $x_2 = 2$

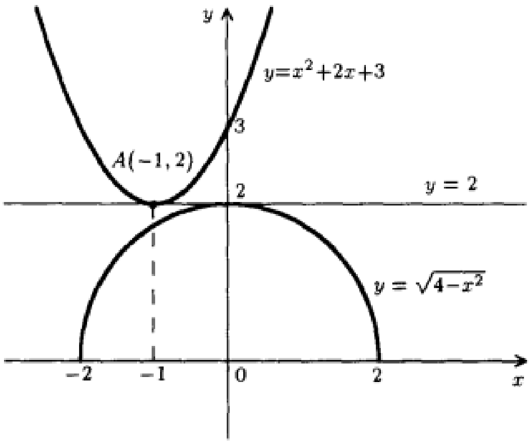
J: $x_1 = 0$, $x_2 = 2$.

4. Use of graphs in solving equations.

In some cases, when solving equations, it is useful to draw sketches of graphs of its right and left sides. In this, the sketches of the graphs help us to parse the number axis into sets, from which the solutions of the equation will be known. The solution can be found by looking at the sketch of the graph, but you cannot write the answer from the graph, you need to justify it.

7- example. $x^2+2x+3=\sqrt{4-x^2}$ (5) solve the equation.

Solution. (5) the domain of the equation $-2\le x\le 2$. $f(x)=x^2+2x+3$va $g(x)=\sqrt{4-x^2}$ draw a sketch of function graphs.



$y=2$draw a straight line. As can be seen from the figure, the graph of the function lies above this line, and the graph of the function lies below. He is trying to plot a straight line of graphs at different points. As a result, the equation has no solution. Let's prove it. For everyone $\sqrt{4-x^2}\le 2$, $x^2+2x+3=(x+1)^2+2\ge 2$. Faqat $x=-1$da $f(x)=2$, faqat $x=0$da $g(x)=2$. It follows that equation (5) has no solution.

J: ∅.

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