SOLVING NON-STANDARD TEST CHART USING THE FUNCTION

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Annotation: In this article, methods of solving parametric equations and non-standard tests using graphs of elementary functions, which are easily understood by students and lead to solutions in a short time, and examples that are very complex and long to be solved analytically, very easy methods of solving using graphs of elementary functions are presented with the help of examples.

Key words: equation, non-standard equations, function graph, inequality, system of equations, test, equation solution, coordinate system, even function, odd function, whole solution, method of integration by pieces, graphic method, integral.

Equations that are sharply different in appearance from the usual ones, as well as equations that are similar in appearance to the usual ones, but cannot resolved by the usual methods (for example: with $x^4 + \cos x^7 = 1$) also occurs. Such equations are non-standard equations as are referred to.

Non-standard equation of the balance of much general method available is not. The same reason for such equations, solving the function from the graph, different from the texture, from the disparity and so on from around the world use on comes. Us to the following theorem so the equation and solving it is worth [1-10].

Theorem: You a real number for any M in the collection $f(x) \geq a, g(x) \leq a$ reasonable disparity, then in the collection M $f(x) = g(x)$ equation

$$\begin{cases} f(x) = a \\ g(x) = a \end{cases}$$

Equations of the system are equally strong.

From the test samples

1-Example. This $2^{|x|} = \cos x$ equation solution, which is in the answer given?

A) $x = 0$ B) $x = \pi$ C) $x = \emptyset$ D) will not be detected.

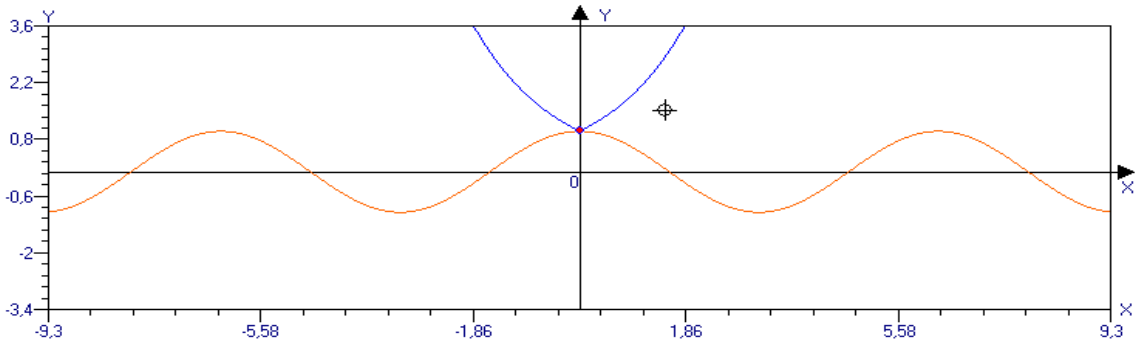
Of charging. I method: according to the high theorem $f(x) = 2^{|x|}, g(x) = \cos x$ is. Also

$$\begin{cases} f(x) \geq 1 \\ g(x) \leq 1 \end{cases} \cup [f(x) = g(x)] \Rightarrow \begin{cases} f(x) = 1 \\ g(x) = 1 \end{cases} \Rightarrow \begin{cases} 2^{|x|} = 1 \\ \cos x = 1 \end{cases}$$

$$\Rightarrow \begin{cases} |x| = 0 \ and \\ x = 2 \ are \ easily \ mobile \ application, k \epsilon Z \end{cases} \Rightarrow \begin{cases} x = 0 \\ x = 0, k = 0 \end{cases}$$

the equation solution $x = 0$. It is Answer: A).

II method: the equation 2 units to function, we will allocate. $y_1 = 2^{|x|}$, $y_2 = cosx$. This is y_1 and y_2 the graph of the function of one coordinate system we retire (1-graph).



1-graph. $y_1 = 2^{|x|}, y_2 = \cos x$.

One-from the graph that are seen as the name suggests, $y_1\ and\ y_2$ the function $x = 0$ at the point receives the same value.Therefore the equation is $x = 0$ the solution has. Answer: A).

2-Example. This $2\cos x = 2^x + 2^{-x}$ equation has multiple roots [9-23].

A) 1 B) 3 C) ∞ D) $\emptyset$.

Charging: I method: Theorem to according, $f(x) = 2\cos x$, $g(x) = 2^x + 2^{-x}$ in. Also

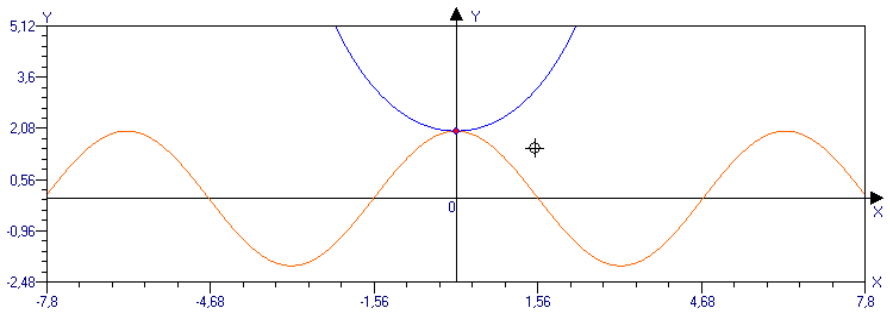
$$\begin{cases} -2 \le f(x) \le 2 \\ g(x) \ge 2 \end{cases} \Rightarrow [f(x) = g(x)] \Rightarrow \begin{cases} f(x) = 2 \\ g(x) = 2 \end{cases} \Rightarrow \begin{cases} 2\cos x = 2 \\ 2^x + 2^{-x} = 2 \end{cases}$$

$$\Rightarrow \begin{cases} \cos x = 1 \\ 2^{2x} + 1 = 2^{x+1} \end{cases} \Rightarrow \begin{cases} x = 2\ is\ easily\ mobile\ application, k \epsilon Z \\ x = 0 \end{cases}$$

$$\Rightarrow \begin{cases} x = 0, k = 0 \\ x = 0 \end{cases}$$

$x = 0$ is one solution.

II method: Given $2\cos x = 2^x + 2^{-x}$ equation on the tab we can define two functions:$y_1 = 2\cos x,\ y_2 = 2^x + 2^{-x}$. This function is the graph of one of the coordinates system we drawn (2-graph).



2-graph. $y_1 = 2cosx, y_2 = 2^x + 2^{-x}$.

Two-from the graph that arisen as the name suggests, $y_1\ and\ y_2$ of the function, one common point have. Answer: A).

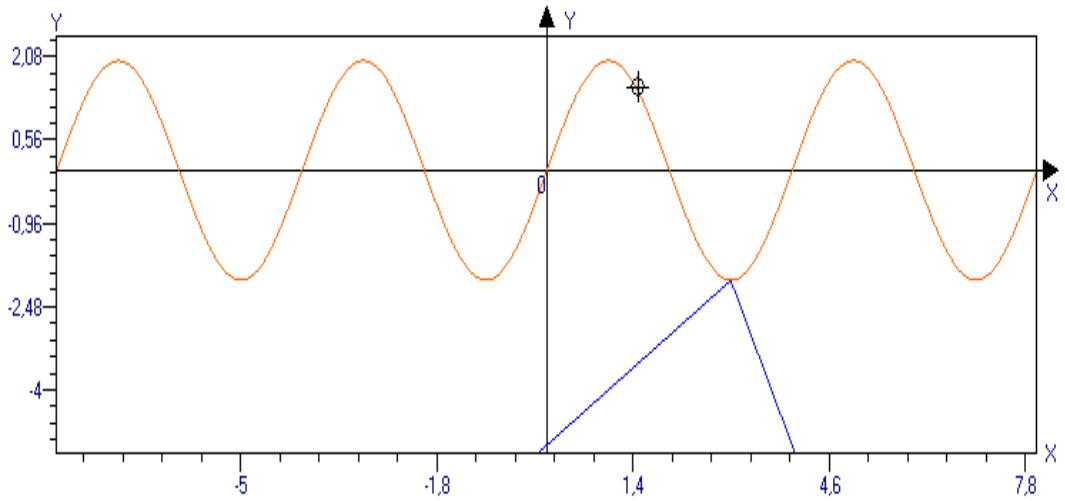
3. Example. This $2|x-3| + x - 1 + 2$ with $\frac{nx}{2} = 0$ equation has multiple roots.

A) 1 B) 2 C) $\emptyset$ D) 3.

Solve: the equation 2 units to function form, define, we can:

$$y_1 = 1 - x - 2|x - 3|, y_2 = 2 \text{ with } \frac{nx}{2}$$

and this function, the graph we plot (3-graph).



3-graph. $y_1 = 1 - x - 2|x - 3|,\ y_2 = 2 \text{ with } \frac{nx}{2}$.

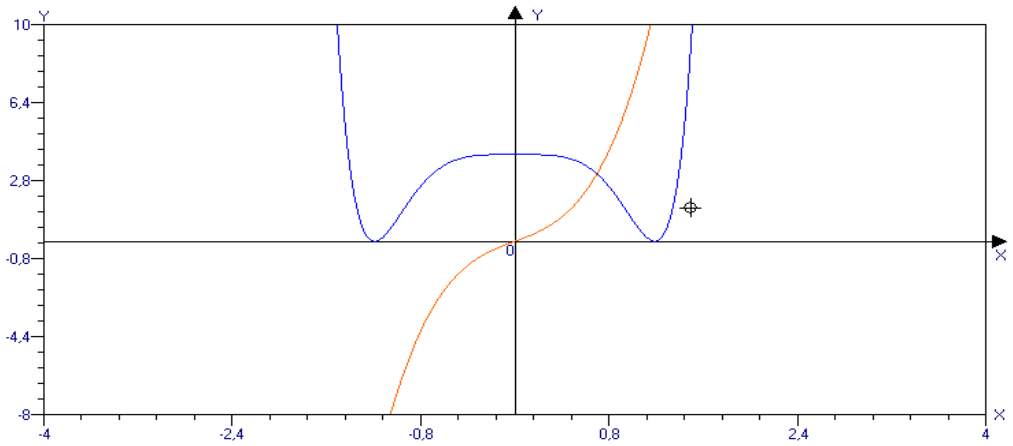
Three-from the graph that arisen as the name suggests,y_1 and y_2, the function of only one common point have. Issue terms according to the root is, the root of the few was asked.

Answer: A).

4. Example. $2x + 5x^3 = x^8 - 4x^4 + 4$ Multiple negative solution to have?

A) 0 B) 2 C) 1 D) 4.

Solve: the equation of the right side of $f(x) = x^8 - 4x^4 + 4$ that is, the left side of $g(x) = 2x + 5x^3$ the understanding of the character and of the graph of this function is a single in the coordinate system we drawn (4-graph).



4-graph. $f(x) = 2x + 5x^3 g(x) = x^8 - 4x^4 + 4.$

$f(x)$ – pair function $g(x)$ –is an odd function. If the equations of negative solutions able to be, II and IV the intersection of need. Four-from the graph that arisen as the name suggests, $f(x) and\ g(x) is$ the negative of the function there is no solution [20-35].

Answer: A).

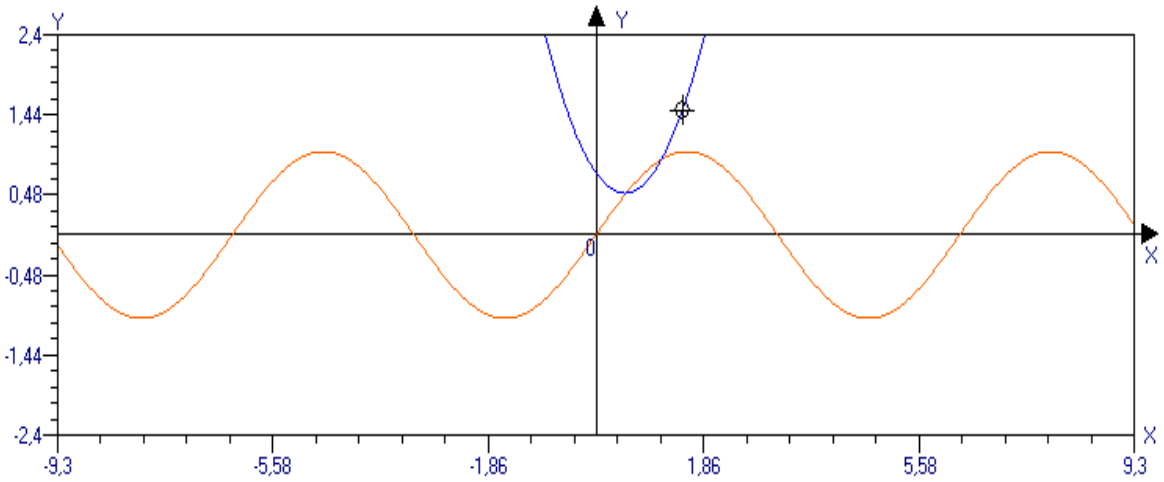
5-Example. This with $x = x^2 - x + 0{,}75$ equation the roots of which age-related to the incision?

A) $[0; \pi]$ B) $\left[\frac{3\pi}{2}; 2\pi\right]$ C) $[-\pi; 0]$ D) $x = \emptyset$.

Solve: the equation 2 units to function, we will allocate:

$$y_1 = \text{with}\, x\ , y_2 = \ x^2 - x + 0{,}75$$

This function is the graph of one of the coordinates system we drawn (5-graph).



5-graph. $y_1 = \text{with}\, x\ , y_2 = x^2 - x + 0{,}75$.

Five-from the graph that arisen as the name suggests, the solution $in[0;\pi]$ belongs to the incision.

Answer: A).

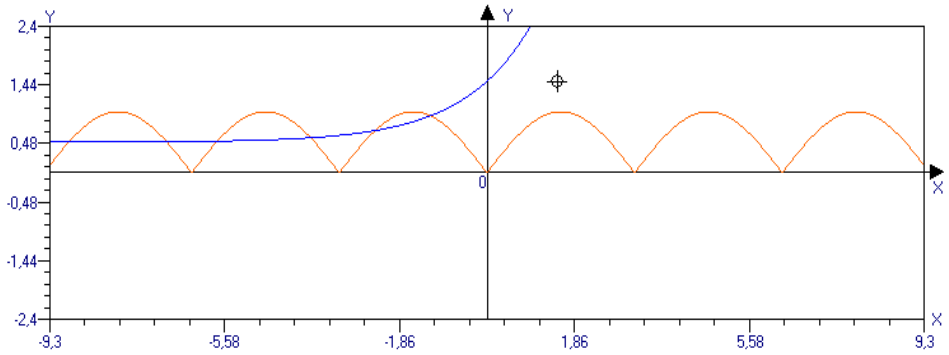
6-Example. This $2^x + 0{,}5 = |\text{with}\, x|$ negative multiple of the solution of the equation?

A) Unlimited many B) ∅ C) 14 D) 1.

Solve: the equation 2 units function tab, define, we can:

$$y_1 = 2^x + 0.5\ , y_2 = |\text{with}\, x|$$

and this function is the graph of one of the coordinates system we drawn (6-graph).



6-graph. $y_1 = 2^x + 0.5\ , y_2 = |\text{with}\, x|$.

6-from the graph that are seen as the name suggests, y_1 *and* y_2 unlimited a lot of negative solutions of the function.

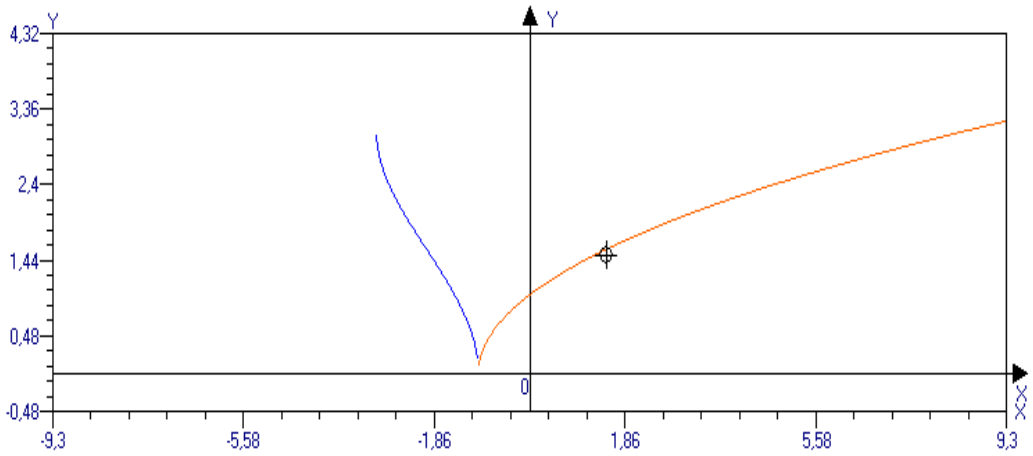
Answer: A).

7--Example. The disparity of most large entire solution find:

$$\sqrt{1+x} \le \arccos(x+2)$$

A) -1 B) 0 C) -2 D) 1.

Charging: Inequality right side$y_1 = \arccos(x+2)$, left side $y_2 = \sqrt{1+x}$ appreciate that character. This function graph drawing we (7-graph).



7-graph. $y_1 = \arccos(x+2)\,, y_2 = \sqrt{1+x}$.

Seven-from the graph, as it is known, the disparity of the whole solution to have and it $is\ x = -1$ is equal to. Answer: A).

8-Example. $\int_0^1 \operatorname{arc} x\, dx$=? Calculation.

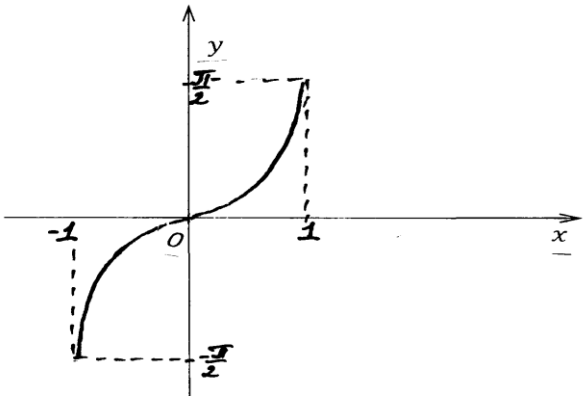
Of charging. I method: This integral calculation for the many pieces of the integrated method we will use.

$$\int_0^1 \operatorname{arc} x\, dx = \begin{vmatrix} it = \operatorname{arc} x \\ du = \frac{dx}{\sqrt{1-x^2}} \\ dv = dx \\ v = x \end{vmatrix} = (x * \operatorname{arc} x)\Big|_0^1 - \int_0^1 \frac{x}{\sqrt{1-x^2}} dx = \frac{\pi}{2} + \frac{1}{2}\int_0^1 \frac{d(1-x^2)}{\sqrt{1-x^2}} =$$

$$\frac{\pi}{2} + \sqrt{1-x^2}\Big|_0^1 = \frac{\pi}{2} + 1.$$

Response: $\int_0^1 \arcsin x\, dx = \frac{\pi}{2} + 1.$

II methods: This integrated graphics in the method as follows, redefined. $y = \arcsin x$ the function schedule we made (8-graph).



8-graph. $y = \arcsin x$.

8-from the graph, the following equality seats:

$\int_0^1 \arcsin x\, dx = 1 * \frac{\pi}{2} - \int_0^1 \text{with}\, y\, dy = \frac{\pi}{2} + \cos y|_0^1 = \frac{\pi}{2} + 1.$

Such integrated calculation of many pieces of the integrated method than, the function from graphic using solve, comfortable and solution short term to find help will.

Response: $\int_0^1 \arcsin x\, dx = \frac{\pi}{2} + 1.$

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