**Answer on Question #78904 – Math – Calculus**

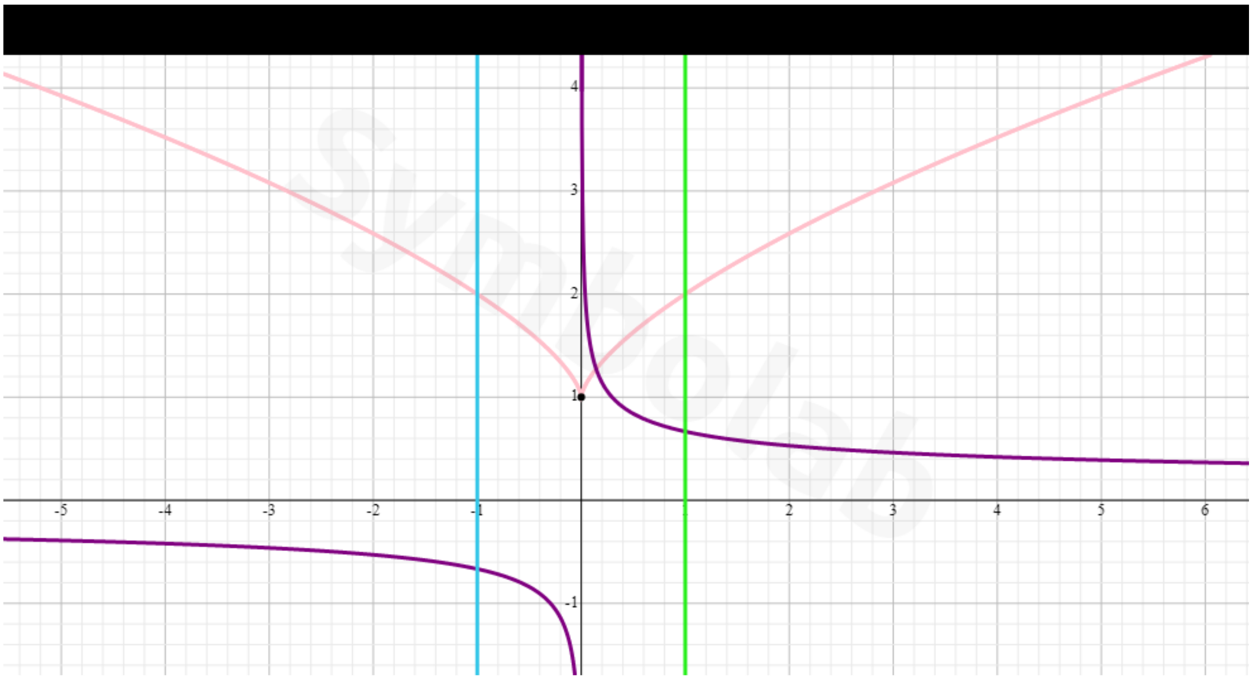
**Question**

1. Rolle's theorem is applicable for the function f, defined by f(x)=1+x^(2/3) in the interval [-1,1]. Is the statement true or false? Give reason in support of your answers.

**Solution**

1. Rolle's theorem states that if a function *f* is continuous on the closed interval [*a*, *b*] and differentiable on the open interval (*a*, *b*) such that *f*(*a*) = *f*(*b*), then *f*′(*x*) = 0 for some *x* with *a* ≤ *x* ≤ *b* [1].

2. Properties of function $f(x) = 1 + x^{\frac{2}{3}}$




Graph 1 ● $f(x) = 1 + x^{\frac{2}{3}}$; ● $f'(x) = \frac{2}{3} \cdot x^{-\frac{1}{3}}$; ● $x = -1$;

● $x = 1$ [2].

As you can see from the graph, f(-1)=f(1) .

The condition of continuous function is satisfied:

$$\lim_{x\to 0}\left(1+x^{\frac{2}{3}}\right)=(1+0^{\frac{2}{3}})=0.$$

But the condition of differentiable function on (-1,1) is not valid. Besides,

$$f'(x)=\frac{2}{3}\cdot x^{-\frac{1}{3}}\neq 0\ \ ,x\in[-1,1]\quad \text{(from the graph)}.$$

3. Conclusion: Rolle`s theorem is not applicable for the function f, defined by f(x)=1+x^(2/3) on the interval [-1,1].

**Answer:** the statement is false.

**Sources**


**1.** William L. Hosch ENCYCLOPÆDIA BRITANNICA// Rolle's theorem|MATHEMATICS (https://www.britannica.com/science/rolles-theorem )

**2.** https://www.symbolab.com/graphing-calculator