

True/False

1. Every differentiable function is continuous.
2. Every continuous function is differentiable.
3. The function $|x|$ is differentiable at $x=0$.
4. The function $|x|$ is continuous at $x=0$.
5. The greatest integer function $[x]$ is a continuous function on \mathbb{R} .

Fill in the blanks:

1. The function $|x|$ is differentiable at $x=.....$.

2. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as

$$f = \begin{cases} 2x-3 & , x \geq 0 \\ -3 & , x < 0 \end{cases} \text{ is at } x=0.$$

3. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as

$$f = \begin{cases} \frac{|x-3|}{x-3} & , x \geq 3 \\ 1 & , x < 3 \end{cases} \text{ is at } x=3.$$

4. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as

$$f = \begin{cases} \frac{|x-3|}{x-3} & , x < 3 \\ \frac{|x-3|}{x-3} & , x \geq 3 \end{cases} \text{ is at } x=3.$$

5. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ defined as

$$f = \begin{cases} \frac{\sin x}{x} & , x \neq 0 \\ 1 & , x = 0 \end{cases} \text{ is at } x=0.$$