

4. In each of the following, if the given statement is true for all f , then mark the \square to the left of TRUE with a \times ; otherwise, mark the \square to the left of FALSE with a \times and give a counterexample.

a. If f has a derivative on $(-\infty, \infty)$, then f has an antiderivative on $(-\infty, \infty)$.

TRUE

FALSE, because it does not hold for $f(x) =$

b. If f has an antiderivative on $(-\infty, \infty)$, then f has a derivative on $(-\infty, \infty)$.

TRUE

FALSE, because it does not hold for $f(x) =$

$|x|$

c. If $f'(x + 2\pi) = f'(x)$ for all x , then $f(x + 2\pi) = f(x)$ for all x .

TRUE

FALSE, because it does not hold for $f(x) =$

x

d. If $f(n) \geq n$ for all positive integers n , then $\lim_{x \rightarrow \infty} f(x) = \infty$.

TRUE

FALSE, because it does not hold for $f(x) =$

$x \cos(2\pi x)$

e. If f is continuous on $(-\infty, \infty)$, then $\frac{d}{dx} \int_0^x f(xt) dt = f(x^2)$ for all x .

TRUE

FALSE, because it does not hold for $f(x) =$

x