

1. In each of the following, if the given statement is true for all functions  $f(x)$  that are defined for all  $x \neq 0$ , then mark the  to the left of TRUE with a **X**; otherwise, mark the  to the left of FALSE with a **X** and give a counterexample.

a.  $\lim_{x \rightarrow 0} f(1/x)$  does not exist.

TRUE

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

0

b.  $\lim_{x \rightarrow 0} xf(1/x)$  exists.

TRUE

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

$x^2$

c. If  $-x^2 < f(x) < x^2$  for all  $x \neq 0$ , then  $\lim_{x \rightarrow 0} f(x) = 0$ .

TRUE

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

d. If  $-1 \leq f(x) \leq 1$  for all  $x \neq 0$ , then  $-1 \leq \lim_{x \rightarrow 0} f(x) \leq 1$ .

TRUE

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

$\sin\left(\frac{1}{x}\right)$

e. If  $\lim_{x \rightarrow 0} \frac{f(x)}{x}$  does not exist, then  $\lim_{x \rightarrow 0} f(x) \neq 0$ .

TRUE

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

$x^{1/3}$