3. In each of the following, if the given statement is true for all continuous functions f that are defined on $(-\infty, \infty)$, then mark the □ to the left of TRUE with a ✗; otherwise, mark the □ to the left of FALSE with a ✗ and give a counterexample.

a. f has a derivative on $(-\infty, \infty)$.

□ TRUE

☒ FALSE , because it does not hold for $f(x) = \boxed{|x|}$

b. f has an antiderivative on $(-\infty, \infty)$.

☒ TRUE

□ FALSE , because it does not hold for $f(x) = \boxed{}$

c. $\dfrac{d}{dx} \displaystyle\int_0^1 f(x)\, dx = f(x)$ for all $0 \le x \le 1$.

□ TRUE

☒ FALSE , because it does not hold for $f(x) = \boxed{1}$

d. If f is increasing on $(-\infty, \infty)$, then f^2 is increasing on $(-\infty, \infty)$.

□ TRUE

☒ FALSE , because it does not hold for $f(x) = \boxed{x}$

e. If f is decreasing on $(-\infty, \infty)$, then e^f is decreasing on $(-\infty, \infty)$.

☒ TRUE

□ FALSE , because it does not hold for $f(x) = \boxed{}$