

## PROBLEM

Let  $f: R \rightarrow R$  be a differentiable function for all values of  $x$  and has the property that  $f(x)$  and  $f'(x)$  have opposite signs for all values of  $x$ . Then,

- a.  $f(x)$  is an increasing function
- b.  $f(x)$  is a decreasing function
- c.  $f^2(x)$  is a decreasing function
- d.  $|f(x)|$  is an increasing function

## SOLUTION

$$c. f(x) f'(x) < 0 \quad \forall x \in R$$

$$\text{or } \frac{1}{2} \frac{d}{dx} (f^2(x)) < 0$$

$$\text{or } \frac{d}{dx} (f^2(x)) < 0$$

Thus,  $f^2(x)$  is a decreasing function.