## TOPIC: GRAPHING THE DERIVATIVE

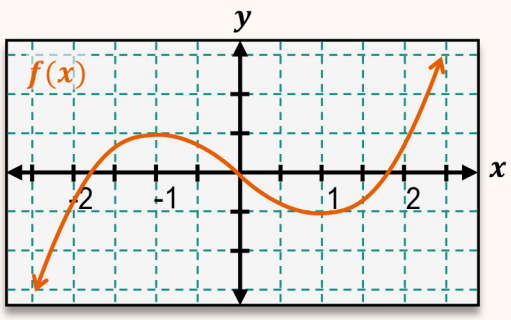
### Graphing the Derivative

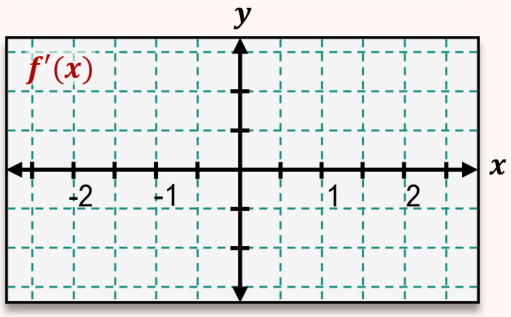
◆ To sketch the graph of $f'(x)$, use the _____ of the tangent of $f(x)$ & its general behavior on certain intervals.

- When $f(x)$ **increasing**, $f'(x)$ is $[+ \mid -]$, $f(x)$ has **horiz. tan.** $f'(x) =$ ____, $f(x)$ **decreasing** $f'(x)$ is $[+ \mid -]$.

**EXAMPLE** For each $x$-value or interval, determine if the slope of $f(x)$ is pos., neg., 0, or und. Then sketch $f'(x)$.

**New** **Graph of a Derivative**

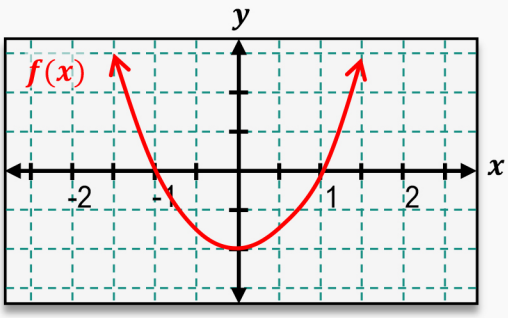


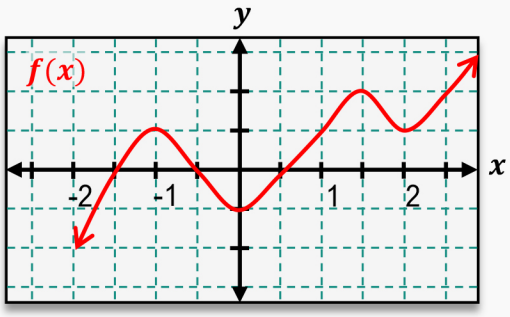

| $x$ | $(-\infty,-1)$ | $-1$ | $(-1,1)$ | $1$ | $(1,\infty)$ |
|---|---|---|---|---|---|
| $f(x)$ | | | | | |
| $f'(x)$ (slope) | | | | | |

## TOPIC: GRAPHING THE DERIVATIVE

**PRACTICE** Based on the graph of $f(x)$, describe the graph of the derivative $f'(x)$ on the interval $(0, \infty)$.

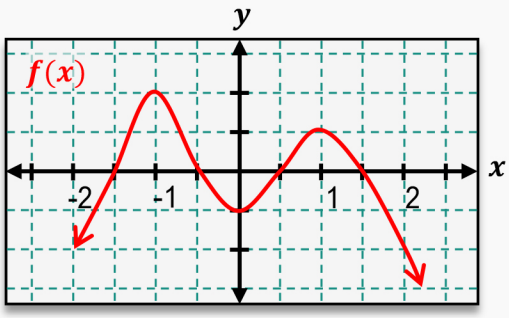



**PRACTICE** Based on the graph of $f(x)$, describe the graph of the derivative $f'(x)$ at the point $x = -1$.

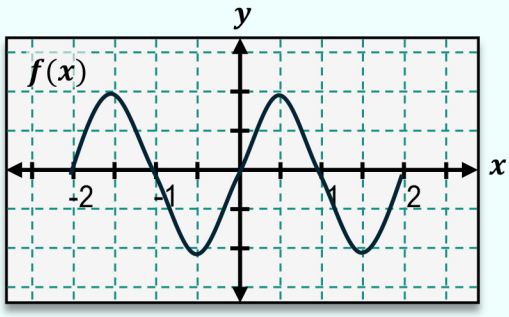


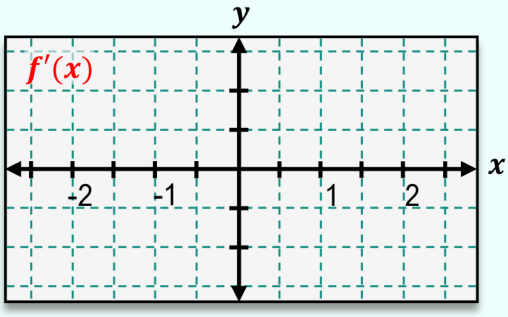
## TOPIC: GRAPHING THE DERIVATIVE

**PRACTICE** Based on the graph of $f(x)$, describe where the derivative curve $f'(x)$ would be *below* the $x$–axis.




**EXAMPLE** Given the function $f(x)$, sketch the derivative function $f'(x)$.



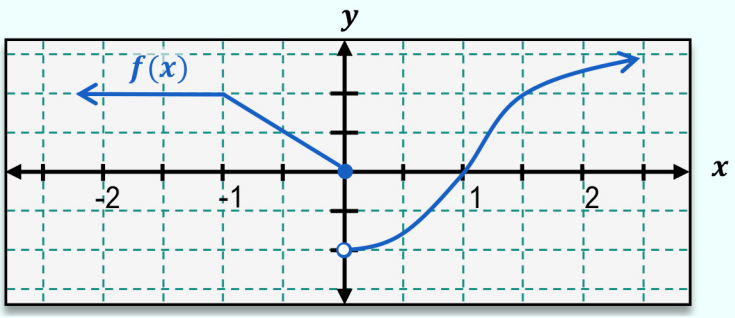
## TOPIC: GRAPHING THE DERIVATIVE

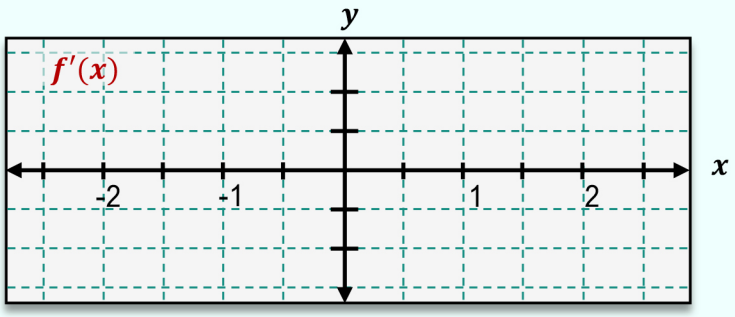
### Graphing the Derivative – Special Cases

◆ If there is a discontinuity or _____ on the graph of $f(x)$, then $f'(x)$ DNE and has a _____ there.

- Recall: the slope of any line is a _____.

**EXAMPLE** Use the graph of $f(x)$ to sketch $f'(x)$.

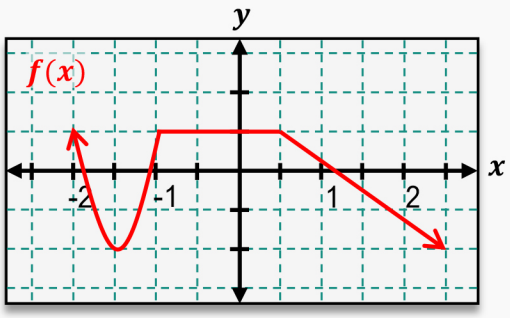



| $x$ | $(-\infty,-1)$ | $-1$ | $(-1,0)$ | $0$ | $(0,\infty)$ |
|---|---|---|---|---|---|
| $f(x)$ | | | | | |
| $f'(x)$ (*slope*) | | | | | |

## TOPIC: GRAPHING THE DERIVATIVE

**PRACTICE** Based on the graph of $f(x)$, describe all points where the derivative $f'(x)$ would have a jump.




**EXAMPLE** Given the function $f(x)$, sketch the derivative function $f'(x)$.