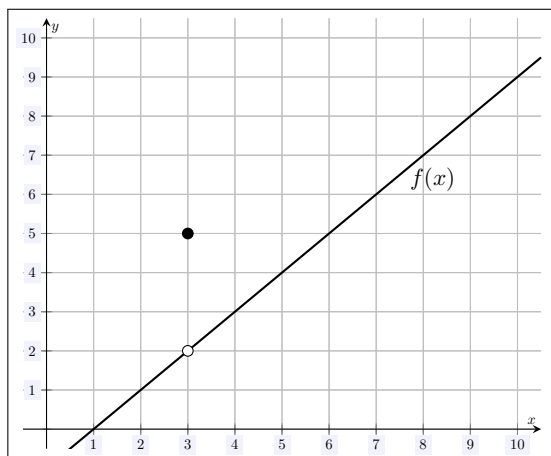


Check-In 01/15. (True/False) True/False: If $f(3) = 5$, then $\lim_{x \rightarrow 3} f(x) = 5$.

Solution. The statement is *false*. Recall that the limit of a function (if it exists) is what the output gets ‘close’ to as the input gets ‘close’ to its limiting value. The fact that $f(3) = 5$ does not mean the outputs are all ‘close’ to 5 when x is ‘close’ to 3. For instance, consider the function $f(x)$ plotted below.



Despite the fact that $f(3) = 5$, $\lim_{x \rightarrow 3} f(x) = 2$ because all the outputs are ‘close’ to 2 when the inputs are ‘close’ to 3.

Check-In 01/17. (True/False) True/False: Let $f(x)$ be a function defined on all real numbers such that $\lim_{x \rightarrow \pi} f(x) = 10$. Then it must be that $\lim_{x \rightarrow \pi^+} f(x) = 10$.

Solution. The statement is *true*. Recall that the limit (if it exists) is what the output gets ‘close’ to as the input gets ‘close’ to its limiting value. Because $\lim_{x \rightarrow \pi} f(x) = 10$, the outputs of $f(x)$ are all ‘close’ to 10 whenever x is ‘close’ to π —no matter how x is ‘close’ to π . The right-hand limit $\lim_{x \rightarrow \pi^+} f(x)$ asks what the outputs are ‘close’ to if x is ‘close’ to π —but bigger than π . But we already know that the outputs are ‘close’ to 10. Therefore, it must be that $\lim_{x \rightarrow \pi^+} f(x) = 10$. Recall that $\lim_{x \rightarrow a} f(x) = L$ if and only if $\lim_{x \rightarrow a^-} f(x) = L$ and $\lim_{x \rightarrow a^+} f(x) = L$.