Exercise 1 *Find*

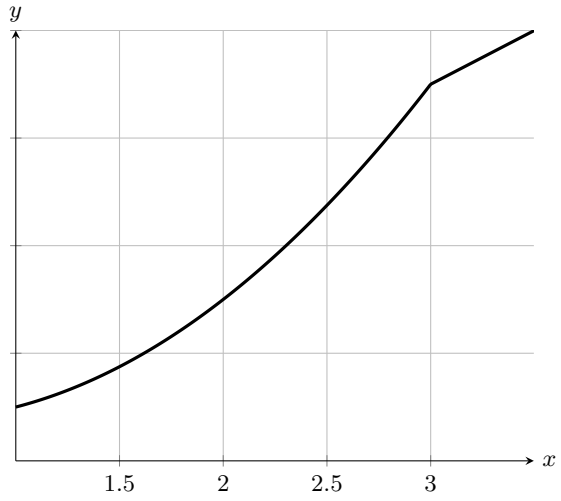
$$\lim_{x\to 3} f(x) = \boxed{7}.$$

where

$$f(x) = \begin{cases} x^2 - x + 1 & x \leq 3, \\ 2x + 1 & x > 3. \end{cases}$$

Hint: *Both pieces of* $f(x)$*,* $x^2 - x + 1$*, for* $x \leq 3$*, and* $2x + 1$*, for* $x > 3$*, are continuous for all* x*. However, for the limit* $\lim_{x\to 3} f(x)$ *to exist, both the left-hand and the right-hand limits of* $f(x)$ *at* 3 *must exist and be equal.*

Hint: *Take a look at the graph of the function*



Hint: *Evaluating* $\lim_{x\to 3^+} f(x)$ *we see that it is equal to* 7*. This follows because, for* $x > 3$*, we are on the piece of* $f(x)$ *given by* $2x + 1$ *and the limit* $\lim_{x\to 3}(2x + 1) = 2 \cdot \lim_{x\to 3}(x) + \lim_{x\to 3}(1) = 7$*, certainly. On the other hand, evaluating* $\lim_{x\to 3^-} f(x)$ *we see it is equal to* 7*. This follows because, for* $x \leq 3$*, we are on the piece of* $f(x)$ *given by* $x^2 - x + 1$ *and the limit* $\lim_{x\to 3}\left(x^2 - x + 1\right) = \left(\lim_{x\to 3}(x)\right)^2 - \lim_{x\to 3}(x) + \lim_{x\to 3}(1) = 7$*, certainly. These are equal, so the limit exists is equal to* 7*.*