

Survey of Calculus

Exercise: Determine $\lim_{x \rightarrow 4} f(x)$ for the function f defined by

$$f(x) = \begin{cases} x^2 - 6, & \text{if } x \neq 4, \\ 1, & \text{if } x = 4. \end{cases}$$

Solution: Notice that $f(4) = 1$, but $f(x) = x^2 - 6$ when $x \neq 4$. In order to determine the limit of $f(x)$ as x approaches 4, we look to the values of $f(x)$ when x is *close but not equal to* 4. So

$$\lim_{x \rightarrow 4} f(x) = \lim_{x \rightarrow 4} x^2 - 6 = (4)^2 - 6 = 16 - 6 = 10.$$

