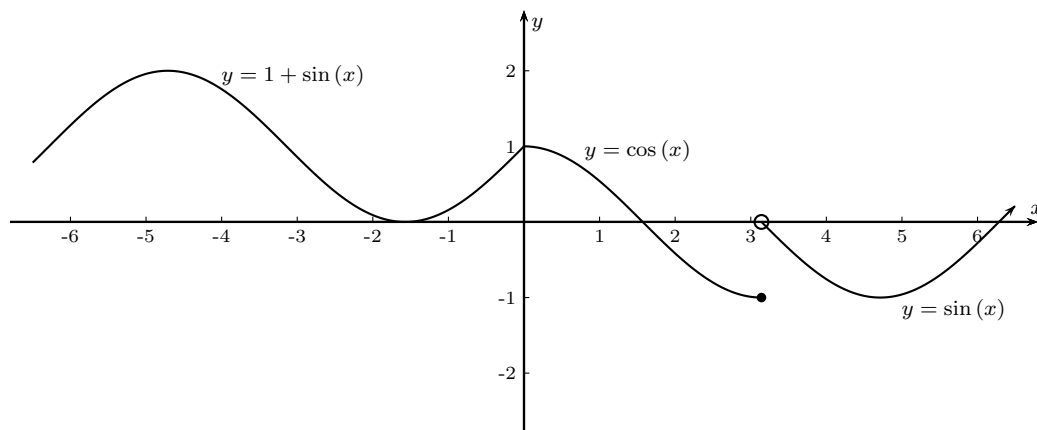


Calculus I, Section 2.2, #12
The Limit of a Function

Sketch the graph of the function and use it to determine the values of a for which $\lim_{x \rightarrow a} f(x)$ exists.¹

$$f(x) = \begin{cases} 1 + \sin(x) & \text{if } x < 0 \\ \cos(x) & \text{if } 0 \leq x \leq \pi \\ \sin(x) & \text{if } x > \pi \end{cases}$$



From the graph, the only value for which $\lim_{x \rightarrow a} f(x)$ does not exist is $x = \pi$.

Thus, $\lim_{x \rightarrow a} f(x)$ exists for all a contained in the interval $(-\infty, \pi) \cup (\pi, \infty)$.

¹Stewart, *Calculus, Early Transcendentals*, p. 93, #12.