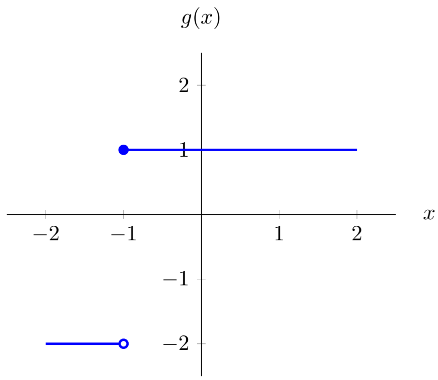
10. [4 points] For each part, draw a function on the given axes that satisfies the given conditions. Or, if no such function exists, write DNE. Make sure your graphs are clear and unambiguous.

Solution: Note that for both graphs, there are many functions that satisfy the listed properties.

a. [2 points]

A function $g(x)$ that satisfies

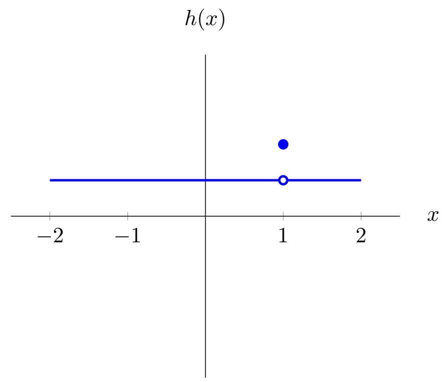
- $\lim_{x \to -1^+} g(x) = 1$ and
- $\lim_{x \to -1^-} g(x) = -2$.



b. [2 points]

A function $h(x)$ that satisfies

- $\lim_{x \to a} h(x)$ exists for every $-2 < a < 2$ and
- $h(x)$ is not continuous at $x = 1$.



11. [6 points]

Suppose that $T(x) = A\cos\left(\frac{\pi}{2}x\right) + C$, where A and C are constants. To the right is a table of values for $T(x)$.

x	0	2	3
$T(x)$	10	-2	4

a. [1 point] What is the period of $T(x)$?

Solution: We know we can find the period using $\frac{2\pi}{B}$, and for $T(x)$ we see that $B = \frac{\pi}{2}$. So, the period is $\frac{2\pi}{\pi/2} = \frac{4\pi}{\pi} = 4$.

Answer: period = **4**

b. [2 points] Find the values of A and C.

Solution: The amplitude A is half the difference between the largest and smallest values of $T(x)$. Since the period is 4 and there is no horizontal shift, the largest value of $T(x)$ occurs at $x = 0$ and the smallest value occurs at $x = 2$. So the amplitude is $\frac{1}{2}(T(0) - T(2)) = 12$.

The vertical shift C is the midpoint value of $T(x)$. Since the period is 4 and there is no horizontal shift, this occurs at $x = 1$ and $x = 3$. From the table we see that $T(3) = 4$.

Answer: $A =$ **6** **Answer:** $C =$ **4**

c. [3 points] Let $Q(x)$ be the quadratic approximation of $T(x)$ at $x = 2$. Find a formula for $Q(x)$. Your answer should not include the constants A or C.

Answer: $Q(x) = -2 + \frac{3\pi^2}{4}(x-2)^2$