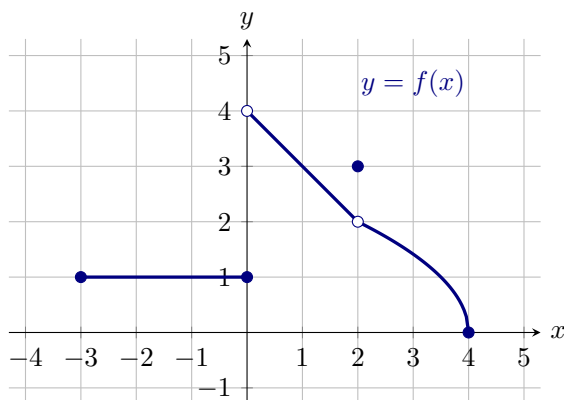


**Exercise 1** The entire graph of a function  $f$  is given below.



Find the following values.

$$\begin{aligned} f(0) &= \boxed{1} \\ f(2) &= \boxed{3} \\ f(f(0)) &= \boxed{3} \\ f(-1) &= \boxed{1} \end{aligned}$$

Find the following limits, if they exist. If a limit does not exist, explain why.

$$\lim_{x \rightarrow -2} f(x) = \boxed{1}$$

**Multiple Choice:**

- (a) The limit does exist. ✓
- (b) The limit does not exist because  $f$  is constant near  $-2$ .
- (c) The limit does not exist because  $f(-2)$  does not exist.
- (d) The limit does not exist because  $\lim_{x \rightarrow -2^-} f(x) \neq \lim_{x \rightarrow -2^+} f(x)$ .

$$\lim_{x \rightarrow -3^+} f(x) = \boxed{1}$$

**Multiple Choice:**

- (a) The limit does exist. ✓
  - (b) The limit does not exist because  $f$  is constant near -3.
  - (c) The limit does not exist because  $f$  is not defined to the left of -3.
  - (d) The limit does not exist because  $\lim_{x \rightarrow -2^-} f(x) \neq \lim_{x \rightarrow -2^+} f(x)$ .
- 

$$\lim_{x \rightarrow 2} f(x) = \boxed{2}$$

**Multiple Choice:**

- (a) The limit does exist. ✓
  - (b) The limit does not exist because the value of  $f$  at 2 is very different from the value of  $f$  near 2.
  - (c) The limit does not exist because  $f(2)$  does not exist.
  - (d) The limit does not exist because  $\lim_{x \rightarrow 2^-} f(x) \neq \lim_{x \rightarrow 2^+} f(x)$ .
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$$\lim_{x \rightarrow 1} f(x) = \boxed{3}$$

**Multiple Choice:**

- (a) The limit does exist. ✓
  - (b) The limit does not exist because  $f$  is not constant near 1.
  - (c) The limit does not exist because  $f(1)$  does not exist.
  - (d) The limit does not exist because  $\lim_{x \rightarrow 1^-} f(x) \neq \lim_{x \rightarrow 1^+} f(x)$ .
- 

$$\lim_{x \rightarrow 0^-} f(x) = \boxed{1}$$

**Multiple Choice:**

- (a) The limit does exist. ✓
- (b) The limit does not exist because  $f$  is not defined to the right of 0.

- (c) *The limit does not exist because  $f(0)$  does not exist.*
- (d) *The limit does not exist because  $\lim_{x \rightarrow 0^-} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$ .*
- 

$$\lim_{x \rightarrow 0^+} f(x) = \boxed{4}$$

**Multiple Choice:**

- (a) *The limit does exist. ✓*
- (b) *The limit does not exist because  $f$  is not defined to the left of 0.*
- (c) *The limit does not exist because  $f(0)$  does not exist.*
- (d) *The limit does not exist because  $\lim_{x \rightarrow 0^-} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$ .*
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$$\lim_{x \rightarrow 0} f(x) = \boxed{DNE}$$

**Multiple Choice:**

- (a) *The limit does exist.*
- (b) *The limit does not exist because  $f$  is not defined the same way on either side of 0.*
- (c) *The limit does not exist because  $f(0)$  does not exist.*
- (d) *The limit does not exist because  $\lim_{x \rightarrow 0^-} f(x) \neq \lim_{x \rightarrow 0^+} f(x)$ . ✓*
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