

## Lesson 2.3 Limit of a Piecewise Function

### Lesson 2.3: Piecewise Function

↳ functions are graphed with different domains

**Goal:** Determine the value of the limit of a function as the variable approaches a real number in a piecewise function.

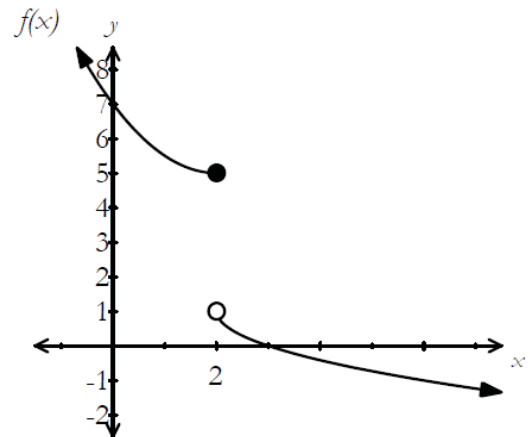
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#### Example 1

Determine the limit of the following piecewise function as  $x$  approaches 2.

#### Think About:

What is the limiting value that  $f(x)$  approaches as  $x$  approaches 2 from the left? from the right?



→

## Example 2

Evaluate the following limits:

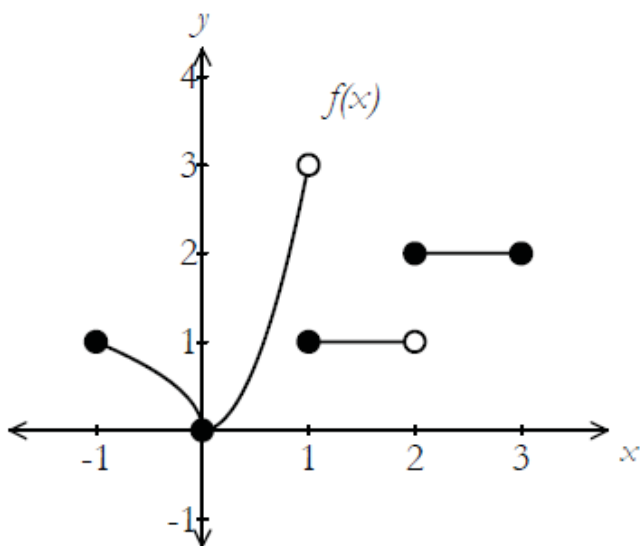
(i)  $\lim_{x \rightarrow -1^+} f(x)$

(ii)  $\lim_{x \rightarrow 1^-} f(x)$

(iii)  $\lim_{x \rightarrow 1^+} f(x)$

(iv)  $\lim_{x \rightarrow 2^+} f(x)$

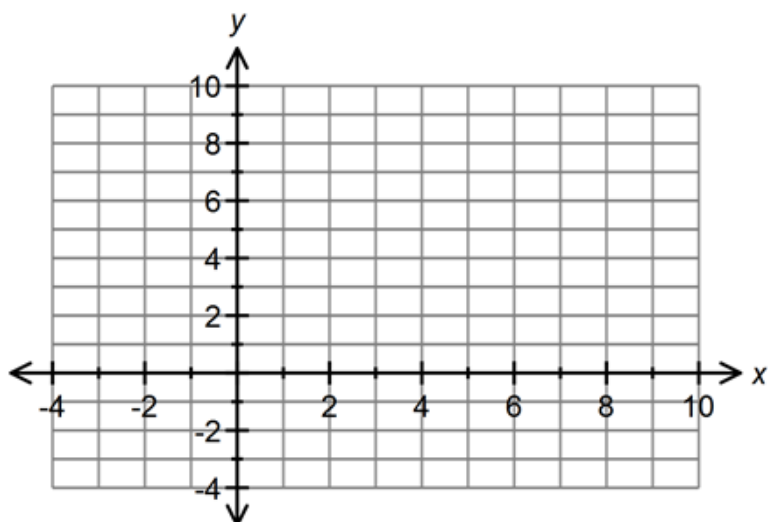
(v)  $\lim_{x \rightarrow 2^-} f(x)$



Example 3

i) Evaluate  $\lim_{x \rightarrow 1} f(x)$  where  $f(x) = \begin{cases} 3 - x^2, & x < 1 \\ x - 1, & x \geq 1 \end{cases}$

Verify using a graph:



ii) Evaluate  $\lim_{x \rightarrow -2} f(x)$

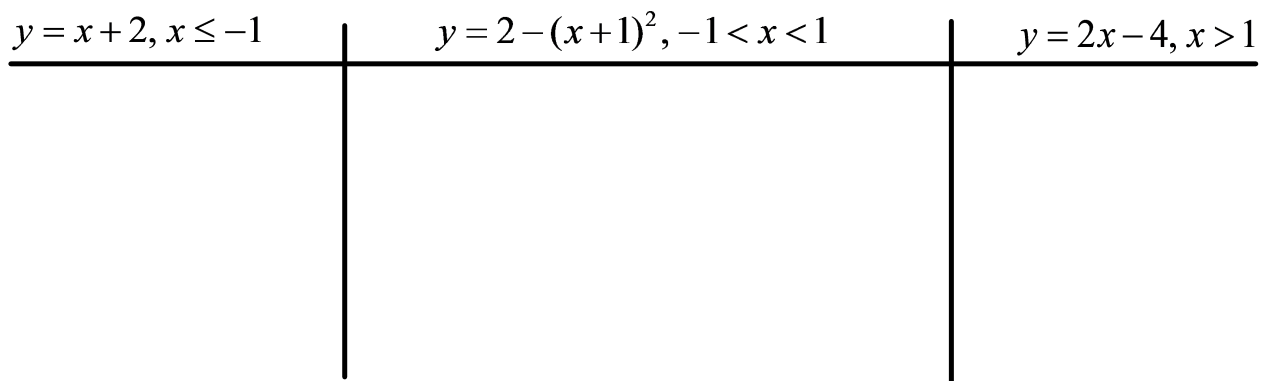


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### Example 4

Graph the piecewise function and determine the following limits

$$f(x) = \begin{cases} x+2, & x \leq -1 \\ 2-(x+1)^2, & -1 < x < 1 \\ 2x-4; & x > 1 \end{cases}$$



(a)  $\lim_{x \rightarrow 1^+} f(x)$

(b)  $\lim_{x \rightarrow 1^-} f(x)$

(c)  $\lim_{x \rightarrow 1} f(x)$

(d)  $f(-1)$

