This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. To estimate the one-sided limit of the function below as x approaches 5 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{5}{x}-1}{x-5}$$

The solution is $\{4.9000, 4.9900, 4.9990, 4.9999\}$, which is option A.

A. $\{4.9000, 4.9900, 4.9990, 4.9999\}$

This is correct!

B. $\{5.0000, 4.9000, 4.9900, 4.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

C. $\{4.9000, 4.9900, 5.0100, 5.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

D. $\{5.1000, 5.0100, 5.0010, 5.0001\}$

These values would estimate the limit of 5 on the right.

E. $\{5.0000, 5.1000, 5.0100, 5.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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2. Based on the information below, which of the following statements is always true?

As x approaches 4, $f(x)$ *approaches* 11.633.

The solution is $f(x)$ is close to or exactly 11.633 when x is close to 4, which is option A.

A. $f(x)$ is close to or exactly 11.633 when x is close to 4

B. $f(x) = 4$ when x is close to 11.633

C. $f(x)$ is close to or exactly 4 when x is close to 11.633

D. $f(x) = 11.633$ when x is close to 4

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 4. It says **absolutely nothing** about what is happening exactly at $f(4)$!

---

3. To estimate the one-sided limit of the function below as x approaches 7 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{7}{x}-1}{x-7}$$

The solution is $\{6.9000, 6.9900, 6.9990, 6.9999\}$, which is option D.

A. $\{6.9000, 6.9900, 7.0100, 7.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

B. $\{7.0000, 6.9000, 6.9900, 6.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 7 doesn't help us estimate the limit.

C. $\{7.1000, 7.0100, 7.0010, 7.0001\}$

These values would estimate the limit of 7 on the right.

D. $\{6.9000, 6.9900, 6.9990, 6.9999\}$

This is correct!

E. $\{7.0000, 7.1000, 7.0100, 7.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 7 doesn't help us estimate the limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

---

4. Evaluate the limit below, if possible.

$$\lim_{x\to 5} \frac{\sqrt{9x-9}-6}{6x-30}$$

The solution is 0.125, which is option B.

A. 0.083

You likely memorized how to solve the similar homework problem and used the same formula here.

B. 0.125

* This is the correct option.

C. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

D. 0.500

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

E. None of the above

If you got a limit that does not match any of the above, please contact the coordinator.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 5$.

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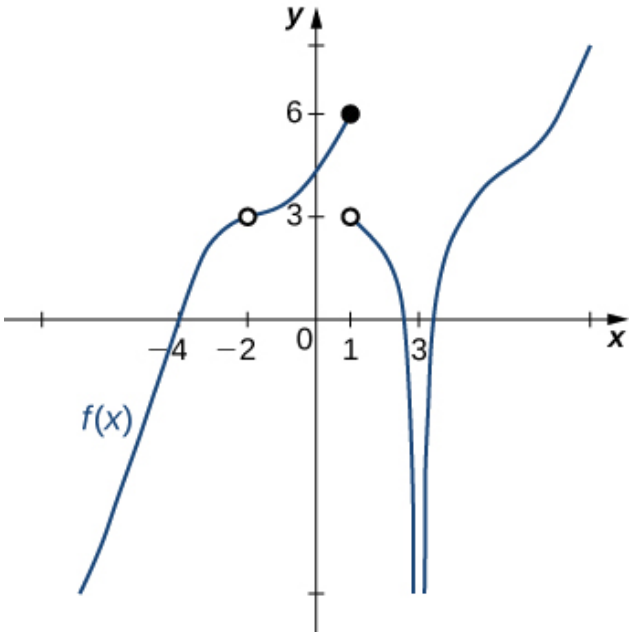
5. For the graph below, evaluate the limit: $\lim_{x\to 1} f(x)$.



The solution is The limit does not exist, which is option D.

A. 3

B. $-\infty$

C. 6

D. The limit does not exist

E. None of the above

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

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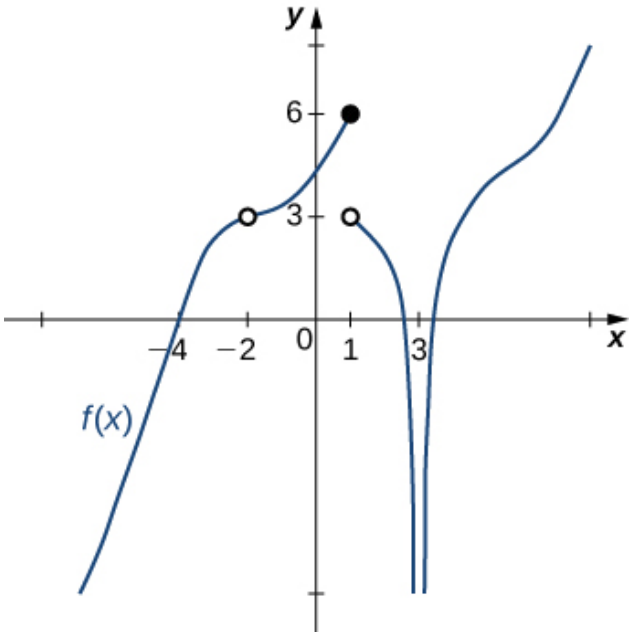
6. For the graph below, evaluate the limit: $\lim_{x \to -2} f(x)$.



The solution is 3, which is option B.

A. $-\infty$

B. 3

C. -2

D. The limit does not exist

E. None of the above

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

7. Based on the information below, which of the following statements is always true?

$$\textit{As } x \textit{ approaches } \infty, \ f(x) \textit{ approaches } 13.274.$$

The solution is $f(x)$ is close to or exactly 13.274 when x is large enough., which is option B.

A. x is undefined when $f(x)$ is large enough.

B. $f(x)$ is close to or exactly 13.274 when x is large enough.

C. $f(x)$ is close to or exactly ∞ when x is large enough.

D. $f(x)$ is undefined when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach ∞. It says **absolutely nothing** about what is happening exactly at $f(\infty)$!

---

8. Evaluate the limit below, if possible.

$$\lim_{x \to 9} \frac{\sqrt{6x - 29} - 5}{8x - 72}$$

The solution is None of the above, which is option E.

A. 0.306

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

B. 0.100

You likely memorized how to solve the similar homework problem and used the same formula here.

C. 0.012

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

D. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

E. None of the above

* This is the correct option as the limit is 0.075.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 9$.

---

9. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 3^-} \frac{-7}{(x+3)^5} + 5$$

The solution is $f(3)$, which is option A.

A. $f(3)$

B. $-\infty$

C. ∞

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

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10. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to -5^+} \frac{-8}{(x+5)^7} + 6$$

The solution is $-\infty$, which is option C.

A. $f(-5)$

B. ∞

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.
