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

$$\lim_{x \to -4^-} \frac{1}{(x-4)^8} + 8$$

The solution is $f(-4)$, which is option C.

A. ∞

B. $-\infty$

C. $f(-4)$

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.

---

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

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

The solution is $\{0.9000, 0.9900, 0.9990, 0.9999\}$, which is option B.

A. $\{0.9000, 0.9900, 1.0100, 1.1000\}$

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

B. $\{0.9000, 0.9900, 0.9990, 0.9999\}$

This is correct!

C. $\{1.0000, 1.1000, 1.0100, 1.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

D. $\{1.0000, 0.9000, 0.9900, 0.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

E. $\{1.1000, 1.0100, 1.0010, 1.0001\}$

These values would estimate the limit of 1 on the right.

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

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

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

A. $-\infty$

B. ∞

C. $f(5)$

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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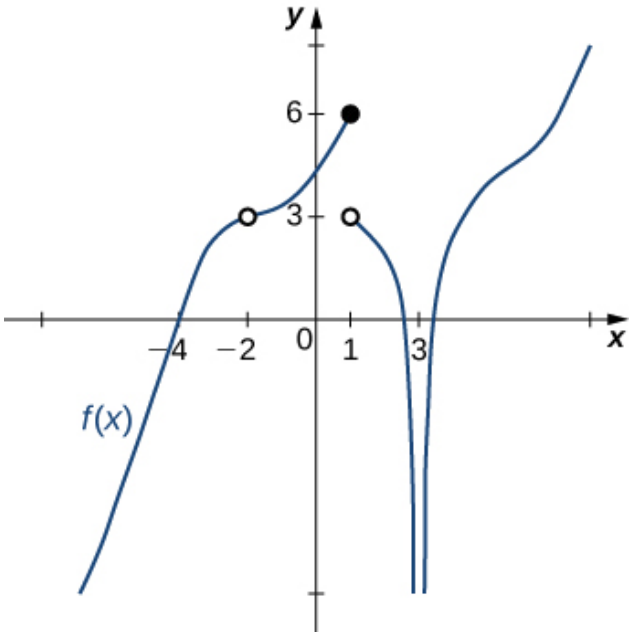
4. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = 0$.



The solution is Multiple a make the statement true., which is option D.

A. -4

B. 0

C. 3

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

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5. Evaluate the limit below, if possible.

$$\lim_{x\to 8} \frac{\sqrt{8x-28}-6}{6x-48}$$

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

A. 0.471

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. 0.014

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

C. 0.083

You likely memorized how to solve the similar homework problem and used the same formula 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 0.111.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 8$.

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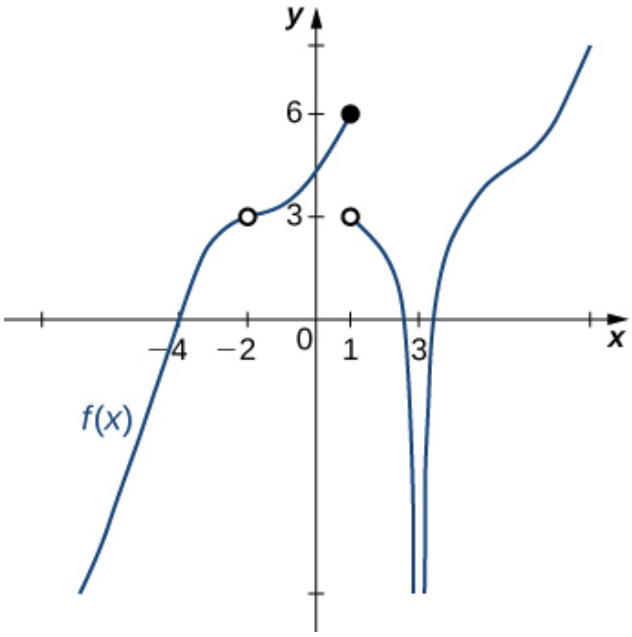
6. For the graph below, evaluate the limit: $\lim_{x\to 1} f(x)$.



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

A. 6

B. $-\infty$

C. 3

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?

$$As\ x\ approaches\ 7,\ f(x)\ approaches\ 0.885.$$

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

A. $f(7)$ is close to or exactly 0

B. $f(0) = 7$

C. $f(0)$ is close to or exactly 7

D. $f(7) = 0$

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 7. It says **absolutely nothing** about what is happening exactly at $f(7)$!

---

8. Evaluate the limit below, if possible.

$$\lim_{x \to 9} \frac{\sqrt{7x - 47} - 4}{3x - 27}$$

The solution is 0.292, which is option B.

A. 0.125

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

B. 0.292

* This is the correct option.

C. 0.882

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

D. ∞

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

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 $x = 9$.

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

$$f(x)\ approaches\ 19.882\ as\ x\ approaches\ 3.$$

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

A. $f(19) = 3$

B. $f(3)$ is close to or exactly 19

C. $f(3) = 19$

D. $f(19)$ is close to or exactly 3

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 3. It says **absolutely nothing** about what is happening exactly at $f(3)$!

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10. To estimate the one-sided limit of the function below as x approaches 10 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{10}{x} - 1}{x - 10}$$

The solution is $\{9.9000, 9.9900, 9.9990, 9.9999\}$, which is option B.

A. $\{10.0000, 10.1000, 10.0100, 10.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 10 doesn't help us estimate the limit.

B. $\{9.9000, 9.9900, 9.9990, 9.9999\}$

This is correct!

C. $\{10.0000, 9.9000, 9.9900, 9.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 10 doesn't help us estimate the limit.

D. $\{10.1000, 10.0100, 10.0010, 10.0001\}$

These values would estimate the limit of 10 on the right.

E. $\{9.9000, 9.9900, 10.0100, 10.1000\}$

These values would estimate the limit at the point and not a one-sided 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 $\frac{\infty}{\infty}$
