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.

$$\lim_{x \to 7^-} \frac{-9}{(x-7)^3} + 2$$

The solution is ∞, which is option A.

A. ∞

B. $f(7)$

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.

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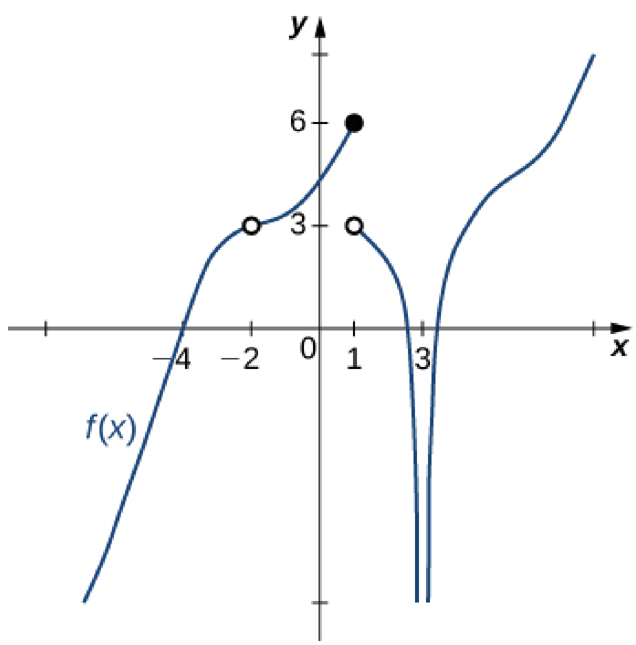
2. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x)$ does not exist.



The solution is 1, which is option A.

A. 1

B. -2

C. 3

D. Multiple a make the statement true.

E. No a make the statement true.

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

---

3. 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 C.

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

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

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

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

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

This is correct!

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

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

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

These values would estimate the limit of 5 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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4. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } 16.016 \textit{ as } x \textit{ approaches } 0.$$

The solution is $f(x)$ is close to or exactly 16.016 when x is close to 0, which is option A.

A. $f(x)$ is close to or exactly 16.016 when x is close to 0

B. $f(x) = 16.016$ when x is close to 0

C. $f(x) = 0$ when x is close to 16.016

D. $f(x)$ is close to or exactly 0 when x is close to 16.016

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 0. It says **absolutely nothing** about what is happening exactly at $f(0)$!

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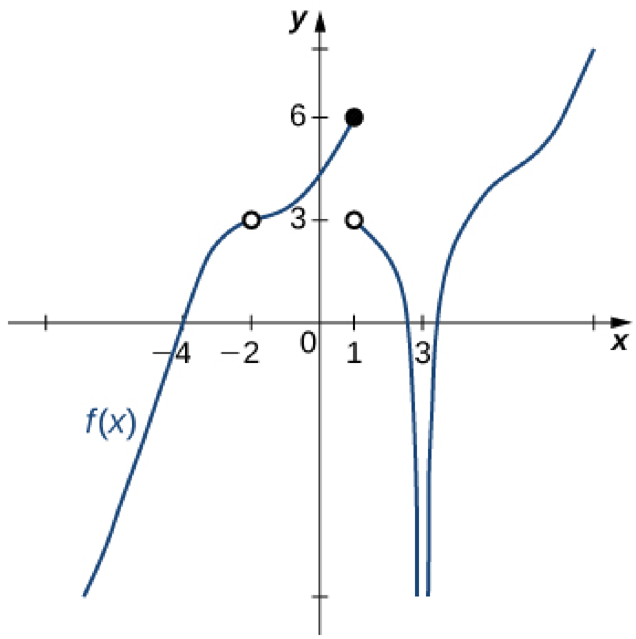
5. For the graph below, evaluate the limit: $\lim_{x \to -2} f(x)$.



The solution is 3, which is option C.

A. -2

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.

---

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

$$\lim_{x\to -5^+} \frac{-1}{(x+5)^3} + 5$$

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.

---

7. To estimate the one-sided limit of the function below as x approaches 9 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{9}{x} - 1}{x - 9}$$

The solution is $\{8.9000, 8.9900, 8.9990, 8.9999\}$, which is option C.

A. $\{9.1000, 9.0100, 9.0010, 9.0001\}$

These values would estimate the limit of 9 on the right.

B. $\{9.0000, 9.1000, 9.0100, 9.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

C. $\{8.9000, 8.9900, 8.9990, 8.9999\}$

This is correct!

D. $\{9.0000, 8.9000, 8.9900, 8.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 9 doesn't help us estimate the limit.

E. $\{8.9000, 8.9900, 9.0100, 9.1000\}$

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 $\frac{\infty}{\infty}$

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

As x approaches ∞, $f(x)$ approaches 16.683.

The solution is $f(x)$ is close to or exactly 16.683 when x is large enough., which is option D.

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

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

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

D. $f(x)$ is close to or exactly 16.683 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 $f(\infty)$!

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9. Evaluate the limit below, if possible.

$$\lim_{x \to 5} \frac{\sqrt{9x - 29} - 4}{2x - 10}$$

The solution is 0.562, which is option B.

A. 0.125

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

B. 0.562

C. ∞

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

D. 0.062

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

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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10. Evaluate the limit below, if possible.

$$\lim_{x \to 6} \frac{\sqrt{7x - 17} - 5}{5x - 30}$$

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

A. 0.529

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. ∞

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

D. 0.020

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

E. None of the above

* This is the correct option as the limit is 0.140.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 6$.
