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.

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

The solution is $f(-8)$, which is option A.

A. $f(-8)$

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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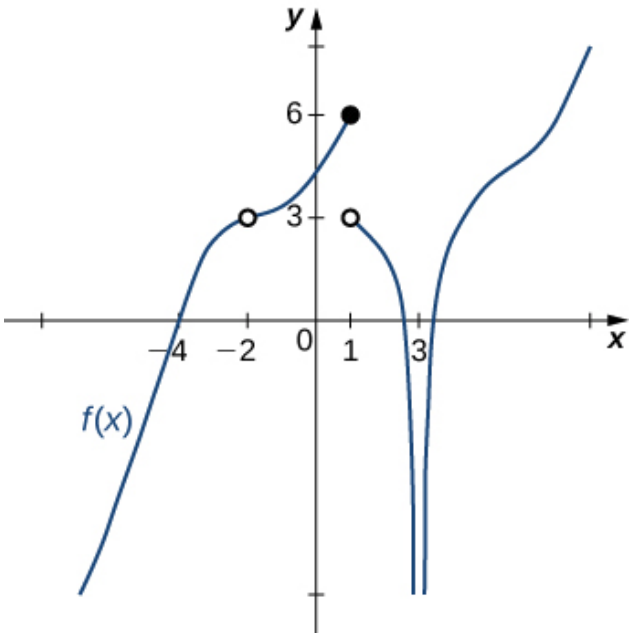
2. For the graph below, evaluate the limit: $\lim_{x \to -4} f(x)$.



The solution is 0, which is option C.

A. $-\infty$

B. -6

C. 0

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.

---

3. To estimate the one-sided limit of the function below as x approaches 4 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{4}{x} - 1}{x - 4}$$

The solution is $\{3.9000, 3.9900, 3.9990, 3.9999\}$, which is option A.

A. $\{3.9000, 3.9900, 3.9990, 3.9999\}$

This is correct!

B. $\{4.0000, 3.9000, 3.9900, 3.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

C. $\{4.1000, 4.0100, 4.0010, 4.0001\}$

These values would estimate the limit of 4 on the right.

D. $\{3.9000, 3.9900, 4.0100, 4.1000\}$

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

E. $\{4.0000, 4.1000, 4.0100, 4.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 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. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } 3.476 \textit{ as } x \textit{ approaches } 1.$$

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

A. $f(1)$ is close to or exactly 3

B. $f(3)$ is close to or exactly 1

C. $f(3) = 1$

D. $f(1) = 3$

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 1. It says **absolutely nothing** about what is happening exactly at $f(1)$!

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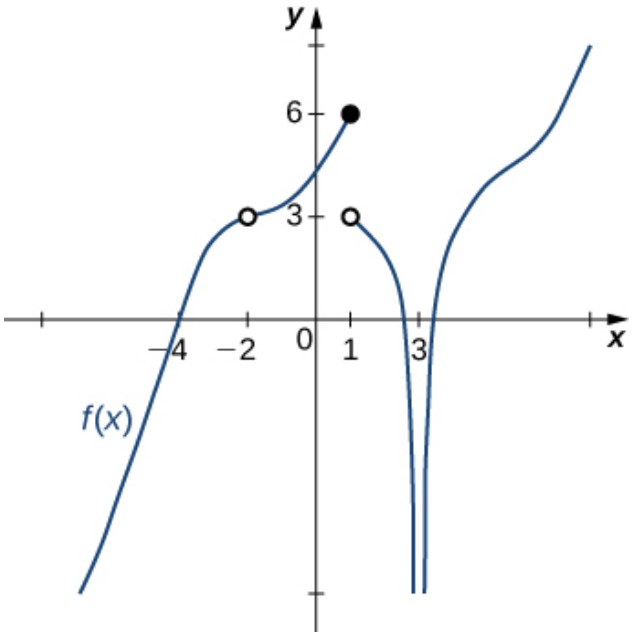
5. For the graph below, evaluate the limit: $\lim_{x \to 1} f(x)$.



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

A. 3

B. 6

C. $-\infty$

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.

$$\lim_{x \to 4^+} \frac{7}{(x-4)^9} + 9$$

The solution is ∞, which is option C.

A. $-\infty$

B. $f(4)$

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.

---

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

$$\frac{\frac{3}{x}-1}{x-3}$$

The solution is $\{3.1000, 3.0100, 3.0010, 3.0001\}$, which is option B.

A. $\{3.0000, 2.9000, 2.9900, 2.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 doesn't help us estimate the limit.

B. $\{3.1000, 3.0100, 3.0010, 3.0001\}$

This is correct!

C. $\{2.9000, 2.9900, 2.9990, 2.9999\}$

These values would estimate the limit of 3 on the left.

D. $\{2.9000, 2.9900, 3.0100, 3.1000\}$

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

E. $\{3.0000, 3.1000, 3.0100, 3.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 3 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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8. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } 7.145 \textit{ as } x \textit{ approaches } 2.$$

The solution is $f(x)$ is close to or exactly 7.145 when x is close to 2, which is option C.

A. $f(x) = 2$ when x is close to 7.145

B. $f(x) = 7.145$ when x is close to 2

C. $f(x)$ is close to or exactly 7.145 when x is close to 2

D. $f(x)$ is close to or exactly 2 when x is close to 7.145

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 2. It says **absolutely nothing** about what is happening exactly at $f(2)$!

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9. Evaluate the limit below, if possible.

$$\lim_{x \to 8} \frac{\sqrt{9x-23}-7}{7x-56}$$

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

A. 0.429

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. ∞

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

C. 0.010

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

D. 0.071

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

E. None of the above

* This is the correct option as the limit is 0.092.

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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10. Evaluate the limit below, if possible.

$$\lim_{x \to 7} \frac{\sqrt{4x - 12} - 4}{9x - 63}$$

The solution is 0.056, which is option C.

A. 0.014

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

B. 0.125

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

C. 0.056

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 $x = 7$.
